

EXHIBIT 10
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**UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
SHERMAN DIVISION**

The State of Texas, et al.,

Plaintiffs;

v.

Google LLC,

Defendant.

Case No. 4:20-cv-00957

Hon. Sean D. Jordan

Special Master: David T. Moran

EXPERT REBUTTAL REPORT OF DR. JOHN CHANDLER, Ph.D.

SEPTEMBER 9, 2024



DR. JOHN CHANDLER, Ph.D.

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I. Background, Qualifications, and Experience

1. I am a professor of marketing and have been a practitioner of marketing for twenty-five years. I have worked in analytics and data science since 1999 with a primary focus on digital marketing. As I will elucidate below, I have been asked to assess areas of digital marketing in which I have particular experience. My academic work is centered on applied data science. I have issued an opening report in this case (“Opening Report”).¹

2. Regarding my academic credentials, my primary academic affiliation is at the University of Montana, where I am a Clinical Professor of Marketing and Ruff Family MS in Business Analytics Faculty Fellow. Additionally, I am a Visiting Professor of Marketing at Universidad ORT Uruguay and an adjunct professor at the University of San Diego. I earned a Doctorate in Statistics from the University of Montana (2010), a Master’s Degree in Mathematics from the University of Washington (1999), and an Honors Bachelor’s Degree in Mathematics from Middlebury College, magna cum laude (1996).

3. Upon graduation from the University of Washington, I began working in marketing analytics with Avenue A, an advertising agency. At the time, Avenue A was the largest digital marketing agency in the world. I was the primary analyst for dozens of advertising clients who spent millions of dollars on marketing. I helped develop fundamental techniques for analyzing digital marketing performance. In 2000, we formed aQuantive, a holding company with Avenue A as one division. I joined the newly created second division, Atlas DMT (“Atlas”), a provider of digital marketing technology to the largest advertising agencies in the world. Atlas was the second-largest provider of advertiser tools, especially advertiser third-party ad serving, behind only DoubleClick, our primary competitor. DoubleClick was acquired by Google in 2008, and DoubleClick formed the backbone of Google’s display advertising products and services.

4. At Atlas, where I became the sole Principal Analyst in the company’s history, I had three main responsibilities: client analytics, thought leadership, and research and design on new products and product features. As a client analyst, I provided custom analytics consulting to our largest advertisers and agencies. From 2000 through 2007, I worked with dozens of agencies and hundreds of advertisers at all scales. I analyzed data from media plans across all marketing channels including display, search, video, and email. My responsibilities included helping these advertisers understand their marketing performance, optimize their spending, and determine how consumers were being influenced by their advertising. This work gave me a deep and foundational understanding of digital marketing, particularly how it was practiced on the “buy side,” represented by advertisers. I worked with data from

¹ Expert Report of John Chandler, Ph.D. ¶¶ 32-39, ¶¶ 43-80, June 7, 2024. (“Opening Report”)

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all major publishers including stand-alone websites, ad networks, and, ultimately, exchanges. I began working with data from the network that ultimately became AdX starting in 2000.

5. My thought leadership involved writing white papers for the industry and giving talks at industry conferences. These white papers were highly scrutinized by my partners and competitors. The first white paper I wrote, “Online Holiday Shopping Patterns Revealed,” appeared on the front page of The Wall Street Journal and was the first research to identify the phenomenon of “Cyber Monday.”² Often, my team transformed thought leadership projects, via a research and design process, into products or product features for our technology platform, Atlas.

6. On the sell side, in 2003, my team and I launched Drive Performance Media (“DrivePM”), which leveraged our technology and analytics to create an ad network, arbitraging unsold digital advertising inventory. I was responsible for building the first large-scale ad-allocation engines. This piece of software was responsible for solving the problem of determining which ad from which advertiser was shown for an available impression. While working for DrivePM, I did foundational work in the data science underpinning advertising networks and exchanges. I was responsible for building models estimating the performance of inventory and forecasting the volume of inventory we would have to sell. I built large-scale non-linear optimizers to maximize performance for advertisers and publishers, subject to thousands of constraints created by the different types of advertising deals. The creation of DrivePM presaged the programmatic display revolution and allowed me to work on data science problems fundamental to both demand-side platforms (“DSPs”) and supply-side platforms (“SSPs”). I was the first analyst to work on DrivePM and I had shared responsibility for developing algorithms generating tens of millions of dollars in profit.

7. I was the lead researcher on Atlas’s tool “Engagement Mapping,” which, when it launched in 2008, was the first large-scale multitouch attribution tool in marketing technology.³ Multitouch attribution is a technology that allows advertisers to apportion the credit for sales across multiple touchpoints in the digital marketing funnel.⁴ My dissertation research involved building Cox proportional-hazards models

² The Wall Street Journal. “Consumers Are Likely to Turn to Web For Holiday Shopping, Analysts Say” (November 21, 2001). Accessed on June 3, 2024. <https://www.wsj.com/articles/SB1006378597369697160>.

³Click Z. “How One Advertiser Uses Microsoft Engagement Mapping” (May 12, 2008). Accessed on June 3, 2024. <https://www.clickz.com/how-one-advertiser-uses-microsoft-engagement-mapping/63267/>.

⁴ Salesforce. “Multi-touch Attribution Defined.” Accessed on August 30, 2024. <https://www.salesforce.com/marketing/multi-touch-attribution/>. (“Multi-touch attribution is a data-

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with time-varying covariates to estimate the appropriate weights for these touchpoints. Multitouch attribution ultimately became the gold standard by which digital marketing campaigns were measured.⁵ The research white paper I wrote, “Measuring ROI Beyond the Last Ad,”⁶ was a reference work for subsequent tool developers.⁷

8. aQuantive was acquired by Microsoft in 2007, and I joined the research team at Microsoft Advertising, as part of Microsoft’s Advertiser and Publisher Solutions (“APS”) division. At this time, it was part of Microsoft’s strategy to provide tools for large advertisers,⁸ though it ultimately sold the assets to Facebook and

driven marketing approach that assigns credit to multiple touchpoints along the customer journey, providing insights into the effectiveness of various marketing channels.”)

⁵ Digiday. “WTF is multi-touch attribution?” (August 30, 2019). Accessed on June 6, 2024. <https://digiday.com/marketing/what-is-multi-touch-attribution/>; Studies using Multitouch attribution models: Li, H. (Alice), and Kannan, P. K. “Attributing Conversions in a Multichannel Online Marketing Environment: An Empirical Model and a Field Experiment.” *Journal of Marketing Research*, vol. 51, no. 1, 2014, pp. 40-56. <https://doi.org/10.1509/jmr.13.0050>; Berman, Ron. “Beyond the Last Touch: Attribution in Online Advertising.” University of Pennsylvania - The Wharton School, March 24, 2018. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2384211; and, Zhao, K., Mahboobi, S. H., and Bagheri, S. R. “Attributing Revenue Across Online Advertising Channels.”, an article in Mouncey, P. “IJMR Editorial.” *International Journal of Market Research*, vol. 61, no. 2, 2019, pp. 124-125. <https://doi.org/10.1177/1470785318817682>.

⁶ Chandler-Pepelnjak, J. “Measuring ROI beyond the last ad.” Atlas Institute Digital Marketing Insight. 2009. pg. 1-6. (“Chandler-Pepelnjak (2009)”)

⁷ Marketing research papers and patent citing Chandler-Pepelnjak (2009): Kitts, Brendan, et al. “System and Method for Determining Effects of Multi-Channel Media Sources on Multi-Channel Conversion Events.” U.S. Patent No. 11,042,897, June 22, 2021; Anderl, Eva, et al. “Putting Attribution to Work: A Graph-Based Framework for Attribution Modeling in Managerial Practice.” *Social Science Research Network*, no. 2343077 (2013). Accessed on August 28, 2024. https://www.researchgate.net/profile/Eva-Anderl/publication/258316917_Mapping_the_Customer_Journey_A_Graph-Based_Framework_for_Online_Attribution_Modeling/links/5c1cbe82458515a4c7eea1cb/Mapping-the-Customer-Journey-A-Graph-Based-Framework-for-Online-Attribution-Modeling.pdf; and, Khan, Fawad, and Kamran Siddiqui. “The Importance of Digital Marketing. An Exploratory Study to Find the Perception and Effectiveness of Digital Marketing Amongst the Marketing Professionals in Pakistan.” (2023).

⁸ Microsoft Corporation 2007 SEC Filing. Form 10-K for the Fiscal Year Ended June 30, 2007. U.S. Securities and Exchange Commission, Commission File No. 0-14278. <https://www.sec.gov/Archives/edgar/data/789019/000119312507170817/d10k.htm>. (“In fiscal year 2006, OSB launched adCenter, our proprietary advertising platform, and has since transitioned the advertising business in the U.S. and certain international markets to adCenter. In fiscal year 2007, we launched new online initiatives, including Windows Live Search™ and Live.com in 54 international markets, Live Local Search in the U.S. and U.K., beta versions of MSN Soapbox (expansion of the MSN Video experience), Virtual Earth™ 3D, Windows Live Hotmail, and others.”)

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stopped participating in the business of selling tools to large advertisers.⁹ As part of my work with Microsoft's APS, I was the data scientist responsible for the billions of daily impressions we released to advertising exchanges. I built models that created price floors for advertising inventory that we released into a real-time bidding auction environment managed by a third party. As part of this work, I became intimately familiar with auction dynamics, helping to write code underpinning our participation in auctions and real-time bidding ("RTB") environments.

9. In 2010, I became Research Director at Microsoft TV. In this capacity, I was responsible for the analysis of a data set of four million households having a cable set-top box with our software on it. We used the information from these set-top boxes to arbitrage television advertising inventory.

10. After leaving Microsoft in 2012, I founded a data science consulting company, Data Insights, which has provided enterprise-class marketing and data science to dozens of clients on the buy side and sell side.¹⁰ Our larger clients include LinkedIn, General Mills, Thrivent Financial, Bulletproof Coffee, eBay, Expedia, Nike, Charter Communications, and The Sierra Club. In addition to these clients, we have worked with many smaller clients. In the course of this consulting work, we have built statistical models and methodologies for a wide variety of business applications. Many of these projects relate to marketing analytics. I have worked with digital marketing data consistently during the entire period I have consulted.

11. I have had numerous consulting engagements that allowed me to work with ad tech companies, typically working on marketing measurement. These relationships have afforded me perspectives similar to those that I enjoyed at Atlas—working across dozens of advertisers and seeing the data they receive, the challenges they face, and understanding their position in the complicated digital advertising landscape.

12. I am professionally and academically engaged in the fields of advertising, marketing, marketing analytics, marketing measurement, the application of data science to marketing, ad tech, and the ad tech ecosystem. I have worked with companies on the buy side with annual marketing budgets ranging from under \$100,000 per year to those with budgets in the billions. I have worked with

⁹ Meta. "Facebook to Acquire Atlas from Microsoft" (February 28, 2013). Accessed on August 30, 2024. <https://about.fb.com/news/2013/02/facebook-to-acquire-atlas-from-microsoft/>. Tech Crunch. "Facebook Confirms It Will Acquire Atlas Advertiser Suite from Microsoft To Close The Ad Spend Loop" (February 28, 2013). Accessed on June 3, 2024. <https://techcrunch.com/2013/02/28/facebook-acquires-atlas/>.

¹⁰ Data Insights, LLC. "About Page, John Chandler". Accessed August 30, 2024. <https://www.datainsightsllc.com>.

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four of the companies whose advertising budget is in the top ten in the U.S. as measured by Ad Age.¹¹

13. In addition to my professional experience, I have academic experience relevant to advertising ecosystems, advertising measurement, and programmatic display advertising. In my dissertation, I applied the tools of statistical learning to web-scale data sets and built advanced attribution models on millions of records to understand marketing effectiveness.¹²

14. I have extensive survey experience. While at Atlas and Microsoft, I worked on teams deploying hundreds of surveys on behalf of advertisers and publishers. I assisted with the design of the survey instrument, the plan for the survey deployment, and the dissemination of the survey results. I defined the sampling frame, determined the methodology, and was responsible for the analysis of the survey. I have taken classes in quantitative methods and survey design and analysis. I have taught these subjects at the graduate level over the last 20 years. I have worked on academic research projects involving the design and analysis of survey instruments. I have supervised many graduate students in their survey work as part of masters-level and doctoral research.

15. In 2016, I co-authored *Algorithms for Data Science*, one of the first books on data science as a subject and the first textbook to collect and illustrate fundamental algorithms across both machine learning and statistics.¹³

16. I have based my opinions herein on my education in statistics and my work experience in marketing and marketing analytics. I have also based my opinions on the historical documents and empirical evidence cited herein. I am being compensated for my work in this case at my customary rate of \$750 per hour. All the opinions I offer herein I hold to a reasonable degree of professional and scientific certainty. My curriculum vitae is attached to my Opening Report as Appendix A and remains unchanged. It is also reattached to this Report. Additionally, a full list of matters in which I have testified is attached to my Opening Report as Appendix B. Since submitting my Opening Report, I have testified in new matters. An updated Appendix B is attached to this Report.

¹¹ Advertising Age. “Largest advertisers in the United States in 2022 (in billion U.S. dollars).” Chart. June 26, 2023. Accessed June 3, 2024. Accessed via <https://www.statista.com/statistics/275446/adspending-of-leading-advertisers-in-the-us/>.

¹² Chandler-Pepelnjak, John Winston, “Modeling Conversions in Online Advertising” (2010). Graduate Student Theses, Dissertations, & Professional Papers. 670. <https://scholarworks.umt.edu/etd/670>.

¹³ Steele, B., Chandler, J., and, Reddy, S. “Algorithms for Data Science.” Springer International Publishing Switzerland. 2016. pgs 1-423.

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17. Keystone Strategy and staff at Data Insights have provided research support and assistance in my preparation of this report under my supervision, direction, and instruction. My compensation and the compensation of Keystone do not depend on the opinions or testimony that I may give or on the outcome of this case.

II. Assignment

18. I was retained in February 2024 to provide expert analysis and opinions on behalf of all of the Plaintiff States. I have been asked to draw on my industry background and academic expertise to assess the reasoning and analysis of Google's expert witnesses, including but not limited to that of Drs. Anindya Ghose, Itamar Simonson, Steven N. Wiggins, Michael Baye, and Paul R. Milgrom. I have been asked to examine their methodology from both an industry and a scientific perspective.

19. I have been asked to respond to the opinions of Google's experts. I have not evaluated every opinion offered by every expert; claims that are not addressed directly do not imply that I concur with those opinions. My opinions are related to my expertise and are not legal opinions. My work on this matter is ongoing, and I reserve the right to update my opinions as more information becomes available.

20. A list of materials I have relied upon in this Report is included in Appendix C. Appendix D is a supplemented list of materials I relied upon for my Opening Report. I signed the protective order in this case on 2024-03-26 before receiving access to any documents.

III. Opinions Unchallenged from My Opening Report

21. I have reviewed the reports of Drs. Ghose, Simonson, Milgrom, Wiggins, and Baye. These reports do not cause me to change my opinions from my Opening Report, most of which are not disputed in the replies. In fact, the following opinions from my Opening Report are unchallenged by Google's experts:

- 1) Digital marketing is structured into marketing channels, which are used by advertisers in distinct and differentiated ways. Open web display advertising has unique characteristics and serves different purposes or goals for advertisers than other marketing channels.
- 2) A substantial portion of display advertisers purchase their display advertising space through a programmatic auction process, rather than or in addition to guaranteed direct contracts with publishers. Display advertisers use programmatic buying for a variety of reasons, though the primary reason is efficiency. Via programmatic display, advertisers can: (a) increase the number and variety of sites on which their advertisements appear; (b) have greater flexibility to

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modify or change the types of ads, publishers, and targeted viewers of their ads; and (c) reduce the costs of media buying.

- 3) A substantial portion of publishers offer some portion of their advertising inventory for sale through programmatic auctions. Publishers use programmatic selling for a variety of reasons, but the primary one is yield maximization.¹⁴ Via programmatic selling publishers can: (a) have access to a much wider pool of advertisers, increasing the demand for their advertising space; (b) reduce or eliminate the need for and cost of a direct display ad sales staff; (c) provide a sales channel for remnant display space inventory not sold directly; and (d) maximize the portion of available inventory that is sold. This inventory is subjected to a bidding process and sold to the highest bidding advertiser or to a third party acting on the advertiser's behalf.
- 4) There are several types of display auctions, including those with one or more of the following characteristics or structures: (a) first price versus second price; (b) real-time versus one participant having last-look; (c) header bidding versus Google's Open Bidding; and (d) waterfall versus multi-tier versus single-tier. Each of those characteristics is generally understood in the digital advertising and ad tech industries as having a specific algorithmic structure.
- 5) The programmatic purchase and sale of display advertising space is effectuated through services provided by intermediary "Ad Tech" platforms and tools, which generally include, but are not always limited to the following categories: (a) a publisher inventory management system; (b) a publisher ad server; (c) a publisher selling tool; (d) an advertising exchange; (e) an advertiser ad server; and (f) an advertiser buying tool.
- 6) When faced with competitive threats, Google has strategically acquired competitors to maintain and enhance its market position. This approach has enabled Google to eliminate potential rivals and integrate valuable technologies, reinforcing its dominance in the ad

¹⁴ Yield maximization is only one of the reasons publishers participate in programmatic. Through programmatic platforms, publishers can optimize their ad inventory by tapping into a broader pool of advertisers and ensuring higher fill rates and CPMs. Additionally, publishers seek to maintain site quality and provide a positive user experience, as well-curated ad placements can enhance user engagement without disrupting site functionality. Balancing revenue generation with a seamless, non-intrusive ad experience is crucial for retaining both user loyalty and advertiser trust.

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tech ecosystem. Through these acquisitions, Google has built its dominant position in the display advertising market.

- 7) Google provides and has provided platforms and tools in each of the foregoing categories, including its DoubleClick for Publishers (DFP) ad server, its Google Ad Exchange (AdX) exchange, its Google Ad Manager (GAM) ad server, and its DV 360 and Google Ads ad buying tools. Google is recognized in display advertising and the ad tech industry as the predominant player in publisher ad servers, ad exchanges, and ad-buying tools.
- 8) There are inherent conflicts of interest when a single company provides both sell-side and buy-side platforms and tools, such as publisher ad servers and ad buying tools, respectively. The interests of publishers and advertisers are not generally aligned in a transaction for display advertising space. Conflicts of interest can harm the transparency and fairness of the auction process. These conflicts of interest can be a problem with participants who do not have good alternatives.
- 9) Additional conflicts of interest arise when this single company with both buy-side and sell-side tools is also in the exchange business. Google is such a company, and the digital advertising and ad tech industries generally recognize the existence of Google's multiple conflicts of interest.
- 10) Advertisers and publishers depend on transparency and fairness when they engage in the programmatic website display auction process. These in turn depend in large part upon the nature and extent of the available information regarding that auction and the degree of the participants' and intermediaries' access to necessary information.
- 11) To maximize the cost-effectiveness of their purchase of programmatic display advertising, and to optimize their auction-related strategies and platform choices, advertisers typically need: (a) data and information regarding the mechanics and rules of the auction process; (b) an understanding of the algorithms employed by the intermediary platforms, tools, and exchanges; (c) data and information about the website visitors who will ultimately receive the display ad; (d) information about the space (i.e., impression) where the advertisement will be displayed; (e) information about the commission, share, take rate, mark-up, or other portion of their payment that is retained by intermediaries; and (f) data related to the performance and effectiveness of their ad purchases.

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- 12) To maximize their revenues from the programmatic sale of their display advertising space, and to optimize their auction-related strategies and platform choices, particularly price floors, publishers typically need: (a) data and information regarding the mechanics and rules of the auction process; (b) an understanding of the algorithms employed by the intermediary platforms, tools, and exchanges; (c) data and information about the website visitors who will ultimately receive the display ad; (d) information about the commission, share, take rate, mark-up, or other portion of their payments that is retained by the intermediaries; and (e) data related to the performance and effectiveness of their ad sales.
- 13) Restricting or limiting the availability and flow of necessary and critical information to participants and/or intermediaries in the display ad auction process can affect the transparency and overall fairness of the auction process.
- 14) Similarly, denying symmetrical and fair access to inventory, demand, and functionality to some advertisers, publishers, ad servers, exchanges, or ad buying tools involved in an auction (i.e., unequal distribution of information) can harm the transparency and fairness of the auction process.

IV. Summary of Opinions

22. Google's expert reports contain several systematic and fatal errors in their analysis. These errors stem primarily from a lack of industry experience with the practice of marketing and lead Google's experts—Drs. Ghose, Wiggins, Milgrom, Baye, and Simonson—to ignore, elide, or cherry-pick evidence from third-party testimony, Google's understanding of the issues, the academic literature, the research by the experts themselves, and industry research. In fact, Google's experts largely agree with my analysis, but where they disagree, their errors make their conclusions unreliable.

23. I have organized my opinions in this report into five broad categories based on the types of errors made by Google's experts. These categories are as follows:

- 1) Errors stemming from a disregard for or omission of marketing practice in favor of academic research that does not provide a reliable basis for conclusions about the empirical reality of digital marketing practice ("Category One Error").
- 2) Errors stemming from conflation of different types of experiments and a false equivalence between proprietary marketing strategies and auction rules ("Category Two Error").

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- 3) Errors stemming from misapplying the tools of research by using flawed surveys to draw unsupported conclusions about a topic not amenable to surveying (“Category Three Error”).
- 4) Errors related to conflating different advertiser and publisher business practices and conflating recent marketing practice with practice during the time period at issue (“Category Four Error”).
- 5) Errors related to misunderstandings about the nature of audiences and targeting variables across marketing channels (“Category Five Error”).

24. **Category One Error:** The largest category of errors made by Google’s experts is driven by a confusion between the world of academia, the primary domain of each of Google’s experts without exception, and the reality of marketing practice. In particular,

- 1) Dr. Ghose’s report (“Ghose Report”) artificially expands the definition of display advertising in ways that do not reflect reality. In doing so, he ignores his own research, as well as a large body of academic research, industry research, and industry practice.
- 2) The Ghose Report and the reports of Drs. Milgrom (“Milgrom Report”) and Baye (“Baye Report”) fail to appreciate the complementary nature of digital marketing channels and describe a world of substitutability that is untethered from marketing practice, marketing literature, and Dr. Ghose’s own research.
- 3) The Ghose and Milgrom Reports confound optimization possibilities with the optimization techniques and strategies that are used in practice, contradicting experience and research.
- 4) The Baye Report makes repeated unsupported assertions regarding the fluidity of advertiser and publisher behavior that are incorrect and misleading.

25. **Category Two Error:** Google’s expert reports show a surprising confusion about the nature of experiments in online advertising, leading them to erroneously conclude that Google’s behavior is somehow standard practice in the industry. It is not. Marketing companies do conduct experiments, but the costs are typically shouldered by the firms seeking better business outcomes. Google allowed their customers to take the risks, unbeknownst to those customers, while Google reaped the primary benefits. Google’s auction manipulations, beginning with Dynamic Allocation and Enhanced Dynamic Allocation in 2010 and potentially continuing until today, created an unstable environment for firms interacting with Google’s products. Any analysis done by a firm to improve business outcomes during

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this time were made unreliable by Google's conducts. Since customers could never know which auctions had which manipulations running, all auctions during this period bear the taint of Google's manipulation. Google's experts conflate experiments to improve business strategy with experimental manipulation of the "rules of the road" for auctions.

- 1) The Ghose Report claims about how companies conduct experiments do not reflect practice or the norms of the business. These claims mislead in order to exonerate Google from predatory experimental practices.
- 2) Dr. Wiggins's report ("Wiggins Report") puts forth a simplistic narrative that the advertising industry "learns by doing," driving at an incorrect conclusion that Google's behavior reflects industry norms. In fact, Google manipulated the understood rules in its auction environment, where it had a dominant informational advantage, in order to favor itself while others paid the cost. Dr. Wiggins offers experiments disclosed by competitors as evidence that Google's undisclosed manipulations were standard practice.
- 3) The Milgrom Report echoes the errors of the Ghose and Wiggins reports. He extends the false equivalency between strategy-based experiments and Google's rules-based experiments with unfounded and incorrect statements regarding the ability of small advertisers to participate in experiments of any flavor.
- 4) Google's expert reports fail to acknowledge the gross and significant data asymmetry between Google and its clients.

26. **Category Three Error:** Dr. Simonson in his report ("Simonson Report") deploys an extensive set of surveys, with correspondingly extensive methodological flaws, to attempt to answer questions about budget reallocation. It is inconceivable that these questions, requiring nuanced, case-by-case reasoning, and empirical grounding, could be assessed via a survey. They certainly cannot be assessed by Dr. Simonson's survey ("Simonson Survey"), and he draws erroneous conclusions as a result.

- 1) The Simonson Survey attempts to measure a complicated phenomenon that has evolved over decades, using a point-in-time survey with vague language and that elicits a demand effect, making the survey unreliable for the purposes of the Simonson Report.
- 2) In addition to being ill-suited to the task at hand, The Simonson Survey has numerous methodological flaws, making it useless for the task at hand.

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27. **Category Four Error:** Google's expert reports make numerous marketing-related errors based on failures to appreciate the heterogeneity of advertiser and publisher experiences over fifteen years. Google's experts focus capabilities potentially available to the largest, best resourced, and most sophisticated advertisers, ignoring the situation of most media purchasers. Furthermore, they do not acknowledge the significant amount of change over time. Practices evolve more quickly in digital marketing than in more traditional media. As such, it is a mistake to equate behavior in 2024 with common practice even five or ten years earlier. Google's expert reports make this mistake repeatedly. Similarly, the Ghose Report confuses the "art of the possible" with common practice, misunderstanding and misstating the ability to which advertisers are able to reallocate budget in practice.

- 1) The Milgrom Report misunderstands the practice of marketing optimization, assuming that all advertisers and publishers have deep auction knowledge and rapidly approach optimal bidding behavior. These statements contradict research, practice, and my experience.
- 2) While the Category Three Error obviates the need to belabor the survey's methodological flaws, the Simonson Report makes errors in Category Four. By using a survey that is largely similar for advertisers of different sizes and agencies, the Simonson Report fails to appreciate the heterogeneity and greater variance of these audiences, masking the effect it purports to estimate.

28. **Category Five Error:** Google's experts apply a simplistic and surface analysis to critical advertising topics such as funnel usage, audience overlap, and targeting variables. This error, distinct from the Category One Error, represents a false equivalence between disparate categories.

- 1) The Ghose Report makes numerous incorrect statements regarding the substitutability and equivalence of marketing channels based on an incorrect analysis of channel audiences and a misapplication of the principle of the marketing funnel. When discussing targeting, the report equates channels by ignoring differences in data quality, data availability, and the exact nature of data listed under broad categories.
- 2) The Baye Report echoes the errors of the Ghose Report, mistakenly concluding that channels sharing an audience can be treated as substitutable by advertisers.

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V. Category One Error: Theory versus Practice

29. As the old line goes, in theory, there is no difference between practice and theory. In practice, there is.¹⁵ In analyzing the testimony provided by Google's economic experts, a significant disconnect becomes apparent, rooted in the disparity between academic theory and the practical realities of marketing. This divergence, the Category One Error, highlights a fundamental misconception in the reports of Google's experts in their discussion of the marketing landscape.

30. The core of this issue lies in the transition from academic environments to practical application. In this regard, marketing is similar to the practice of law. Law school is essential for training lawyers, but it does not prepare a future attorney entirely for the practice of law, since it underemphasizes the practical facets of law like client interactions and professional comportment.¹⁶ Similarly, post-secondary marketing education has a deep grounding in theory but often fails to include practical information needed to work as a marketer.¹⁷ In this vein, the opinions in Google's expert's reports exhibit critical misapprehensions of marketing.

31. For instance, in their reports, Google's experts' perspectives on the interchangeability and substitutability of digital marketing channels reveal a theoretical view that aligns with neither current marketing practice nor current marketing research. The Ghose, Baye and Milgrom Reports suggest a simplistic view of digital channels as largely substitutable, ignoring the nuanced interplay and complementary nature of these channels in actual marketing strategies. This interpretation is not only out of step with established marketing practices but also

¹⁵ QuoteInvestigator. "In Theory There Is No Difference Between Theory and Practice, While In Practice There Is." April 14, 2018. Accessed on August 27, 2024. <https://quoteinvestigator.com/2018/04/14/theory/>.

¹⁶ Reuters. "Law School Failed to Prepare 45% of Junior Associates for Practice, Survey Finds." April 29, 2024. Accessed on August 26, 2024. <https://www.reuters.com/legal/litigation/law-school-failed-prepare-45-junior-associates-practice-survey-finds-2024-04-29/>; and Jones Merritt, Deborah, and Cornett, Logan. Building a Better Bar: The Twelve Building Blocks of Minimum Competence. Institute for the Advancement of the American Legal System (Oct. 2020). <http://indisputably.org/files/2020/10/IAALS-OSU-Building-a-Better-Bar.pdf>.

¹⁷ Stringfellow, Lindsey, et al. "Mind the Gap: The relevance of marketing education to marketing practice." Marketing Intelligence & Planning (Apr. 2006). Accessed on August 27, 2024. https://www.researchgate.net/profile/Michael-Harker-2/publication/235310275_Mind_the_gap_The_relevance_of_marketing_education_to_marketing_practice/links/64931b3d8de7ed28ba42ab97/Mind-the-gap-The-relevance-of-marketing-education-to-marketing-practice.pdf; and Harrigan, Paul, & Hulbert, Bev. (2011). "How Can Marketing Academics Serve Marketing Practice? The New Marketing DNA as a Model for Marketing Education." Journal of Marketing Education, 33(3), 253-272. <https://doi.org/10.1177/0273475311420234>; and Finch, D., Nadeau, J., & O'Reilly, N. (2013). "The Future of Marketing Education: A Practitioner's Perspective." Journal of Marketing Education, 35(1), 54-67. <https://doi.org/10.1177/0273475312465091>.

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contradicts the findings from Dr. Ghose's own research and the broader body of both academic and industry studies, which recognize the unique, often synergistic roles different channels play in a comprehensive marketing strategy.

32. Additionally, the Ghose, Milgrom and Baye Reports conflate potential optimization strategies, as they exist in theory, and the optimization techniques that are actually employed in practice. This misalignment indicates a lack of appreciation for the real-world constraints and complexities that marketers routinely navigate. The Ghose and Milgrom Reports, for example, draw on theoretical possibilities of optimization without sufficient consideration of how these theories are adapted and applied by practitioners facing practical market conditions and customer behaviors.

33. These discrepancies suggest a broader trend among Google's experts in their reports to rely on theoretical models that, while valuable in academic discourse, fail to capture the full scope of dynamic and sometimes unpredictable marketing practices. This theoretical approach leads to conclusions that, while logically coherent in a controlled academic setting, do not necessarily hold true in the more variable and complex realm of actual market behavior.

A. Category One Error Related to an Artificial Definition of Display Advertising

34. Most of Google's experts, including Drs. Baye and Ghose, take as their starting point, and rely upon, an artificially expansive definition of display advertising. In the process, they ignore standard distinctions that are readily evident in industry,¹⁸ analytical reporting, journalism, and even in Google's own

¹⁸



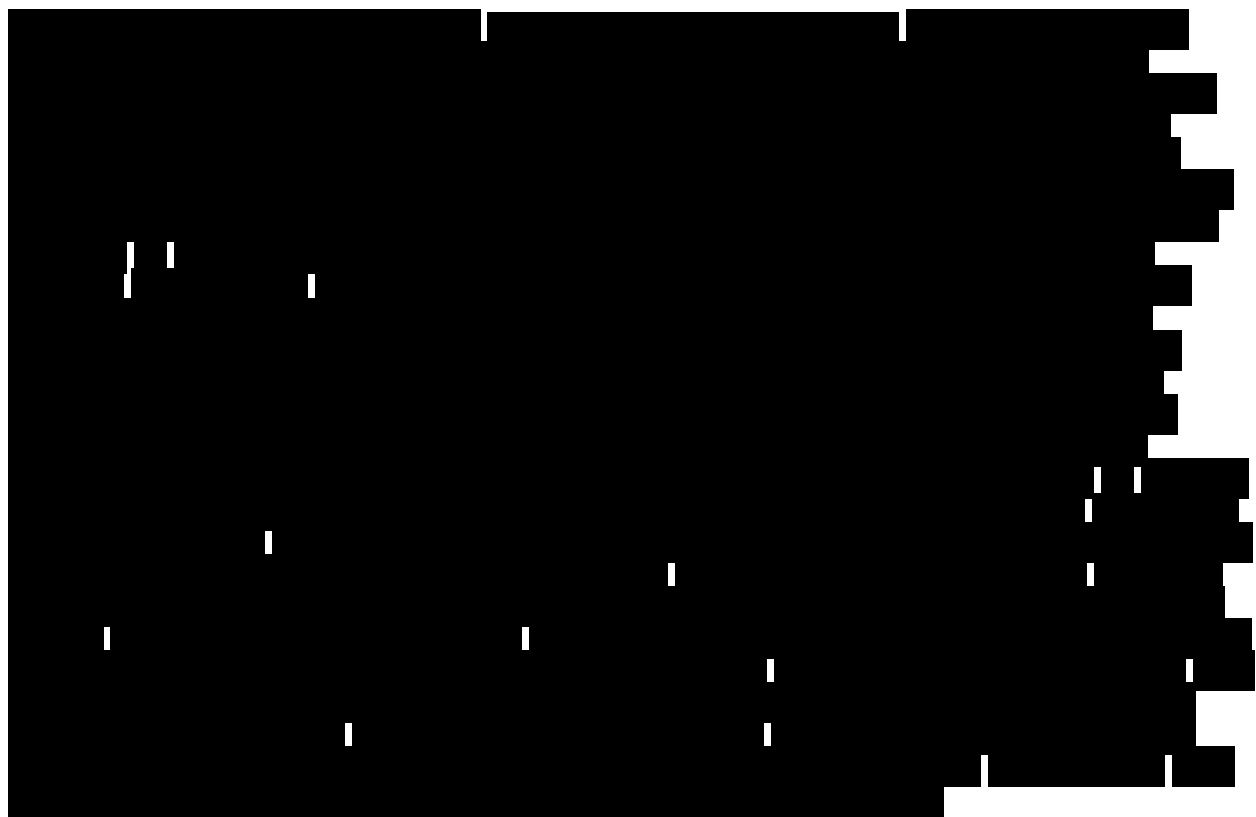
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understanding of display advertising. The Ghose Report also contradicts Dr. Ghose's own published research.

35. The Baye Report argues that "industry participants define display ads as visual ads that contain video, image, or text elements to market products or services to capture the attention users," and goes on to state that these ads "include formats such as banner ads, rich media ads, video ads, and interstitial ads."¹⁹ The report states that they may appear across websites, social media, and in apps using desktop and laptop computers as well as mobile phones, tablets, connected TVs or related devices. He adopts this view of display advertising for much of his report.

36. Similarly, the Ghose Report relies on a definition of display ads that is stretched beyond recognition. As he writes in his report,

Display advertising refers to advertising that is displayed alongside digital media content other than search results. Display advertising is typically understood to include "banners, rich media, sponsorships, video, and ads such as Facebook's News Feed Ads and Twitter's



¹⁹ Expert Report of Michael R. Baye ¶ 45, August 6, 2024. ("Baye Report").

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Promoted Tweets” that appear “on desktop and laptop computers as well as mobile phones, tablets, and other internet-connected devices.”²⁰

37. While display ads proper may share elements with the kinds of visual formats that ads can take (digital ads, after all, are displayed, broadly speaking), this does not make all visually apparent ads across channels display ads any more than it makes search ads (which can have visual and textual elements) display ads. On the basis of this reasoning, the Baye and Ghose Reports might include search ads in their respective definition of display ads, something which they, conspicuously, do not do. Display ads are a distinct form of advertising, a distinction that I have detailed in depth in my Opening Report.

38. **In his own research—in his book *TAP: Unlocking the Mobile Economy* (“*TAP*”)²¹—Dr. Ghose makes several claims that contradict his reply report.** In *TAP*, Dr. Ghose makes hard distinctions between marketing channels and forms of advertising that the Ghose Report treats as part of the same channel. As he writes, “it is tempting to lump web-based advertising (personal computer) together with tablets, and smartphones under headings such as ‘digital’ or ‘online,’ but as we will see in this chapter, each is in its own world as far as engagement, conversion, and use patterns go.”²² This view from Dr. Ghose matches my own from my Opening Report;²³ the Ghose Report does not elucidate the etiology of this new viewpoint.

39. Later in his book, Dr. Ghose distinguishes between display and a variety of other kinds of advertising formats. He asks, “which form works best? Which kinds of ads should be within apps and which ones should be on mobile optimized websites? There are potential negative synergies due to redundancy of information and inefficiency if the messages aren’t specific to the channel.” He notes that:

[S]uccess of ad effectiveness will depend on format and operating system. On Android, banner ads delivered the best conversions for lifestyle content (2.02 percent), according to InMobi. On iOS, banner ads worked best for classified content (2.7 percent). If you want to use video on mobile, you get higher play rates in-app (14 percent) than on mobile Web (8.3 percent).²⁴

²⁰ Expert Report of Anindya Ghose, Ph.D. ¶ 24, July 30, 2024. (“Ghose Report”)

²¹ Anindya Ghose, *Tap: Unlocking the Mobile Economy*, MIT Press, 2017. (“Ghose (2017)”)

²² Ghose (2017) at 165.

²³ Opening Report ¶¶ 32-39, 43-80.

²⁴ Ghose (2017) at 171.

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He goes on to explore the unique power of native ads over display ads. Many people skip over display ads, he writes, so native ads, or advertorials, can be a powerful alternative for recapturing consumer attention.²⁵

40. A review of industry practice, industry marketing analytics, industry standards, industry journalism, academic research on the industry, and Google's own internal practices reject the definition of display advertising that the Ghose and Baye Reports adopt. When we turn to industry practice, we see that distinctions between advertising channels are readily in view and an essential part of industry analysis, planning, and communication. Channel distinctions, especially between open web display and other forms of advertising, are evident in several respects:

41. First, marketers make visible, obvious distinctions between channels based on their budgets.²⁶ Regardless of channel pricing, marketers maintain presences in different channels because they have different audiences, different costs, and different effects.²⁷ I have elaborated on this fact extensively in my Opening Report.²⁸

²⁵ Ghose (2017) at 172. ("Pop-up and banner ads that interrupt our mobile Web experience can be frustrating. Apple's embracement of ad blockers in iOS 9 is a consequence of this kind of frustration among consumers. The adoption of ad blockers and the backlash over excessive advertising by consumers is making firms think about creative ways to circumvent the problem. In this regard, native ads that are blurring the lines between advertisement and content are proving to be remarkably useful. An advertorial is the simplest version of a native ad.").

²⁶



²⁷



²⁸ Opening Report ¶¶ 43-80, ¶¶ 86-92.

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42. Second, marketers specialize within companies because different marketing channels require different kinds of skills.²⁹ Because marketers specialize, marketing budgets on the ground are often shaped by the staff and strengths a department has on hand, rather than by an idealized (and easily reconfigured) optimization model.³⁰

43. Third, many research firms, including Gartner, Statista, eMarketer, and Forrester, regularly conduct analyses of industry practice. All these firms routinely distinguish between marketing channels.³¹ Consider the following headlines and topics from the industry publication Digiday:

- 1) “CMO Strategies: A playbook for marketing channels from social media to streaming.” This article opens as follows:

Each marketing channel comes with its own complexities and nuances. Keeping this in mind, Digiday+ Research has analyzed strategies and challenges across leading marketing channels — like programmatic

²⁹ *E.g.*, within Google itself, Google Ads is composed of specialized engineering teams for Search Ads, Display, Video Ads and Apps (AViD), YouTube Ads, Analytics, Insights & Measurements (AIM), Ad Privacy & Safety (APaS), Commerce, Travel and Customer Engagement. GoogleCareers. “Software Engineer III, Google Ads.” Locations: Mountain View, CA, USA; Pittsburgh, PA, USA; Los Angeles, CA, USA; Cambridge, MA, USA; New York, NY, USA. Accessed on August 28, 2024. <https://www.google.com/about/careers/applications/jobs/results/81273301470454470-software-engineer-iii-google-ads>.

³⁰



³¹ *E.g.*, An upcoming industry webinar by Forrester Research, Master Advertising’s Hottest Channels, which will discuss “channel-specific best practices.” <https://www.forrester.com/webinar/Master%2BAdvertisings%2BHottest%2BChannels/WEB40434>, last accessed Aug. 26, 2024.

Gartner. “Gartner Survey Reveals 71% of CMOs Believe They Lack Sufficient Budget to Fully Execute Their Strategy in 2023.” Accessed on September 5, 2024. <https://www.gartner.com/en/newsroom/press-releases/2023-05-22-gartner-survey-reveals-71-percent-of-cmos-believe-they-lack-sufficient-budget-to-fully-execute-their-strategy-in-2023>.

Statista. “Social media advertising and marketing worldwide.” Accessed on September 1, 2024. <https://www.statista.com/study/15449/social-media-marketing-worldwide/>.

eMarketer. EMARKETER-ad-spending-share-2024-among-us-brand-agencies-by-channel-nov-2023-of-respondents-284063, US Display Ad Spending_2024-2028, Display ad revenue by company.

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display and social media — to identify key trends and best practices in our CMO Strategies series.³²

- 2) “Why some advertisers are reconsidering old school advertising channels.”³³ The article explores the different potential renewed strength of older forms of advertising like direct mail. The article makes clear that channels, whether old or new, are key to marketing.

44. Fourth, industry standards organizations, such as the Internet Advertising Bureau (“IAB”), The Advertising Research Foundation (“ARF”), and the American Association of Advertising Agencies (“AAAA”) distinguish between marketing channels in their reporting.

- 1) The IAB’s annual Internet Advertising Revenue Report lists its results by format, dividing channels into the following groups: search, display, video, audio, and other.³⁴ Moreover, in their Digital Advertising Annual Report, the IAB clearly distinguishes between display and social media.³⁵
- 2) On the ARF website, a quick search of channels yields hundreds of articles. The top five titles that appear in this search, once again, reveal the extent to which channel distinctions are essential to industry analysis.³⁶ Consider the following titles from their archives:

³² Digiday. “CMO Strategies: A Playbook for Marketing Channels from Social Media to Streaming.” Accessed on August 26, 2024. <https://digiday.com/marketing/cmo-strategies-a-playbook-for-marketing-channels-from-social-media-to-streaming/>.

³³ Digiday. “Why Some Advertisers Are Reconsidering Old-School Marketing Channels.” Accessed on August 14, 2024. <https://digiday.com/marketing/why-some-advertisers-are-reconsidering-old-school-marketing-channels/>.

³⁴ IAB. “Internet Ad Revenue Report 2024.” Accessed on August 14, 2024. https://www.iab.com/wp-content/uploads/2024/04/IAB_PwC_Internet_Ad_Revenue_Report_2024.pdf.

³⁵ IAB. “2023 U.S. Digital Advertising Industry Hits New Record, According to IAB’s Annual Internet Advertising Revenue Report.” April 16, 2024. Accessed on August 28, 2024. <https://www.iab.com/news/2023-u-s-digital-advertising-industry-hits-new-record-according-to-iabs-annual-internet-advertising-revenue-report/>.

³⁶ The ARF. PowerSearch: Channels. Accessed on August 26, 2014. <https://powersearch.thearf.org/?iq=channels#member-only>.

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- “Retail Media Networks: Cross-Channel Measurement Best Practices”³⁷
- “I Love a Media Mystery: What Does Integrated Channel Planning Mean? And Why Should We Do It?”³⁸
- “Cross Channel Measurement in a Time of Data Collection Challenges”³⁹
- “Cross-Channel Synergy Effects”⁴⁰
- “ARF KC CRR: Marketing Channel & Format Prioritization”⁴¹

45. The AAAA offers a list of channels to search by in its research articles. A screenshot of the channel distinctions, which includes distinctions between display, native, search, email, social media, and direct mail is below:

The screenshot shows the 4A's Media Channels search interface. At the top, there is a navigation bar with the 4A's logo, search links for Agency and Site, a membership link, and a login/signup button. Below this is a main header for 'Media Channels' with a subtitle. The search area contains a grid of checkboxes for various media channels and formats. The checkboxes are organized into four columns: Digital Channels, Display, Email, and Mobile; Native, Search, Social Media, and Video; Habits & Usage, Media Costs & Spending, Media Research & Analytics, and Media Trends; Other Channels, Alternative, Direct Mail, and Magazine; Newspaper, Out-of-home, Radio, and TV; and Planning & Buying. There are also buttons for 'SUBMIT' and 'RESET FILTERS'.

³⁷ Vijoy Gopalakrishnan and Mike Ellgass. “Retail Media Networks: Cross-Channel Measurement Best Practices”, Circana, Inc. and Circana Group, L.P., Attribution & Analytics Accelerator (Nov. 14, 2023).

³⁸ Erwin Ephron. “I Love a Media Mystery: What Does Integrated Channel Planning Mean? And Why Should We Do It?”, The Ephron Letter (Oct. 2003).

³⁹ Jennifer Pelino. “Cross Channel Measurement in a Time of Data Collection Challenges”, IRI, AUDIENCExSCIENCE 2021 (2021), video, The Advertising Research Foundation (ARF).

⁴⁰ *Cross-Channel Synergy Effects*, News You Can Use, MSI Webinar, MSI (Nov. 22, 2022).

⁴¹ ARF KC CRR: Marketing Channel & Format Prioritization, The ARF Knowledge Center, The ARF (2021), ARF Report.

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The fact that these distinctions are made as the categories for hundreds of articles indicates how deeply entrenched the distinctions across channels are in industry analysis.⁴²

46. Fifth, academic research articles distinguish display from other channels. Alongside practitioners and analysts, academic marketing researchers regularly distinguish the domains of social media marketing, video, in app, native, and connected television (“CTV”) marketing from display. A review of the academic literature yields a plethora of examples.⁴³

47. One particularly clear example of academic research in this vein, is an influential article by Papadimitriou, et al., that explores the impact of display

⁴² American Association of Advertising Agencies (4A's). “Channels.” Accessed on August 14, 2024. <https://www.aaaa.org/home-page/project-tools/channels/>. Note that the AAAA classifies CTV under TV.

⁴³ Bharat Vaishnav & Sourav Ray. “A Thematic Exploration of the Evolution of Research in Multichannel Marketing.” 157 *Journal of Business Research* 113564, (2023). https://www.researchgate.net/profile/Bharat-Vaishnav/publication/366669888_A_thematic_exploration_of_the_evolution_of_research_in_multichannel_marketing/links/63d7e0a562d2a24f92deaba8/A-thematic-exploration-of-the-evolution-of-research-in-multichannel-marketing.pdf. (“online channels identified in this paper include: e-commerce website, mobile site, mobile apps, online display, and paid search,”); Danaher, P. J., & Dagger, T. S. “Comparing the Relative Effectiveness of Advertising Channels: A Case Study of a Multimedia Blitz Campaign.” *Journal of Marketing Research*, 50(4), 517-534 (2013). <https://doi.org/10.1509/jmr.12.0241>. (“The authors illustrate their method for a large retailer that undertook a short-term promotional sale by advertising in television, radio, newspaper, magazine, online display ad, sponsored search, social media, catalog, direct mail, and e-mail channels.”); Spilker-Attig, A., & Brettel, M. “Effectiveness of Online Advertising Channels: A Price-Level-Dependent Analysis.” *Journal of Marketing Management*, 26(3-4), 343-360 (2010). <https://doi.org/10.1080/02672571003594663>; Perlich, C., Dalessandro, B., Raeder, T., Stitelman, O., and Provost, F. “Machine learning for targeted display advertising: transfer learning in action.” *Machine Learning* vol. 95, pp. 103-127. 2014. <https://doi.org/10.1007/s10994-013-5375-2>. (“Online display advertising is a large subfield of the industry where ad targeting holds both promise and challenges. It is promising because of the wealth of data that can be brought to bear to target ads. It is challenging because the display advertising ecosystem is an extremely complicated system where accessing the data and delivering the ads can involve dozens of different corporate players.”); Dinner, I. M., Heerde Van, H. J., & Neslin, S. A. “Driving Online and Offline Sales: The Cross-Channel Effects of Traditional, Online Display, and Paid Search Advertising.” *Journal of Marketing Research*, 51(5), 527-545 (2014). <https://doi.org/10.1509/jmr.11.0466>. (“This article studies the presence, magnitude, and carryover of these cross-channel effects for online advertising (display and search) and traditional media. The analysis considers how these advertising expenditures translate directly into sales, as well as indirectly through intermediate search advertising metrics—namely, impressions and click-through rate. For a high-end clothing and apparel retailer, the authors find that cross effects exist and are important and that cross-effect elasticities are almost as high as own-effect elasticities. Online display and, in particular, search advertising is more effective than traditional advertising.”).

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advertising on search behavior. The authors define display advertising in the opening of the paper and use it as an operational category essential to their analysis.⁴⁴

48. Sixth, even Google itself, both internally and in its business practices, embraces a clear demarcation between open web display and other channels. In my Opening Report, I have mentioned Google, for example, is dominant in display advertising and has a powerful video channel in YouTube, but is not dominant in CTV.⁴⁵ Similarly, Google is dominant in display but not in social media because these are different advertising channels drawing on different skills. Facebook and Google are recognizably different kinds of companies. Google attempted a foray into social media with Google Plus but was not able to gain a foothold.⁴⁶

49. Google employees have also recognized these distinctive advertising channels in testimony given in this case. In the deposition of [REDACTED], Tech Lead Manager with AdX and DoubleClick,⁴⁷ she distinguishes display from other channels. The basis of this distinction is so rooted that it generates different departments, even and most materially, within Google itself. In her testimony, [REDACTED] distinguishes between video and display advertising. When asked about the team she supervised at Google she says, “I took on responsibility for the mobile team. I don’t think I ever took on the video team.”⁴⁸

⁴⁴ Papadimitriou, P., Krishnamurthy, P., Lewis, R., Reiley, D., & Garcia-Molina, H. “Display advertising impact: Search lift and social influence.” Stanford University & Yahoo! Labs. <http://ilpubs.stanford.edu:8090/993/2/displayadinfluenceTR.pdf>. (“Display advertising - showing graphical, often interactive, advertisements (ads) on regular web pages...”).

⁴⁵ YouTube is viewed on mobile apps, via browsers, and on televisions connected to the internet. The last of these constitutes the traditional definition of CTV. Google’s product, Chromecast, competes with other CTV vendors such as Roku, Amazon’s Firestick, and Sling.tv. Relative rankings of CTV providers, with YouTube second to Hulu, can be found here: <https://www.emarketer.com/content/5-charts-youtube-ad-standing-tiktok-meta-ctv-competition>.

⁴⁶ “Google Shuts Failed Social Network Google+.” April 1, 2019. Accessed on August 26, 2028. <https://www.bbc.com/news/technology-47771927>; and Perez, Sarah. “Looking Back at Google+.” TechCrunch, October 8, 2018. Accessed on August 26, 2024. <https://techcrunch.com/2018/10/08/looking-back-at-google/>.

⁴⁷ Deposition of [REDACTED] (former Google employee), May 23, 2024, *The State of Texas et al. v. Google LLC*, Case No. 4:20-cv-00957-SDJ (E.D. Tex.) at 18:25-19:1 (“[REDACTED] Dep.”); GOOG-NE-09329279.

⁴⁸ [REDACTED] Dep. 21:8-10 (“A: ... I took responsibility for the mobile team. I don’t think I ever took on the video team. ... Q: So here you’re distinguishing between search ads and display ads, correct? A: Correct. Q: And you state you worked on display ads on Google’s products for large publishers. Is that true? A: Yes.”); GOOG-NE-09329279-383.

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50. [REDACTED] also testified to the distinction between search and display. When asked “[s]o here you’re distinguishing between search ads and display ads, correct?” she says, “correct.”⁴⁹

51. [REDACTED] makes some significant remarks about her role at Google that help us see how, in the industry world, advertising tools and processes are not determined simply from theoretical ideas. [REDACTED] testifies that, in many cases, her role was to help clarify what is feasible and says that “a lot of the ideas would come from engineers.”⁵⁰ In other words, from people on the ground, not theorists generating optimization models, drive practice, even in organizations as sophisticated as Google.

B. Category One Error Related to Substitutability of Channels

52. The Ghose Report makes inaccurate arguments about the substitutability and interchangeability of marketing channels that are distinct from display marketing on the open web, including social media, video, in app, retail, and CTV marketing.⁵¹ The Ghose Report contends that advertisers can substitute between a variety of different formats that serve similar functions.⁵² He claims that advertisers can buy display ads on other platforms, like social media platforms, and argues that this implies that different formats are interchangeable.⁵³ In practice, display marketing is distinct from social media, in app, video, retail, native, and CTV marketing. None of these are interchangeable with or substitutable for each other: they are complementary.⁵⁴

⁴⁹ *Id.*

⁵⁰ [REDACTED] Dep. 19:16-25. (“A: ... I would also reorganize teams in order to make them more efficient at solving their projects. Code review. Yeah. Talking with product, the product managers to kind of agree on what's feasible and how -- what -- they would say what they want and we would say how to build it, but it was often less clear, the distinction in that. Some of the ideas -- a lot of the ideas would come from engineers. Products ideas would come from engineers and implementation ideas might come from product, although that was less common.”).

⁵¹ Ghose Report § III.

⁵² *Id.*

⁵³ Ghose Report § III.B.2.

⁵⁴ Complementary (adj.) - Describes two [] things that are different but together form a useful or attractive combination of skills, qualities, or physical features. Oxford Learner's Dictionaries. “Complementary.” Accessed on August 30, 2024. https://www.oxfordlearnersdictionaries.com/us/definition/american_english/complementary. In this sense, marketing channels are complementary as they allow marketers to achieve their goals by reaching people in different contexts with different types of creatives. This definition matches my industry experience. Different channels are used within one campaign to allow marketers to reach

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53. The Ghose Report systematically conflates similarity and complementarity with substitutability.⁵⁵ The Ghose Report argues that advertising formats like text ads, image ads, outstream video ads, instream video ads, and native ads are similar to open web display ads and are therefore interchangeable or substitutable.⁵⁶ He argues that because these advertising formats can appear on the same channel, on a news website, for instance, they are interchangeable.⁵⁷ Neither opinion is accurate. These ad formats are complementary but not substitutable.⁵⁸ The presence of different forms of advertising on a single channel does not make each form of advertising that appears there substitutable for the others.

54. Marketers have commented on the complementary nature of different advertising formats and channels, including advertising formats that sometimes appear in the same channel.⁵⁹ In industry practice, marketers typically adopt a set of

people in different contexts, with different types of creatives, at different times, and using different targeting variables. These pieces meld together to produce a comprehensive marketing plan.

⁵⁵ Ghose Report ¶¶ 34, 42-43. (“The order in which an advertiser sequences the mechanical steps of setting up a campaign has no bearing on the degree to which the advertiser considers different formats, devices, and properties to be substitutes”). Substitutability would imply that one channel could be entirely removed from a marketing plan and replaced by another with no harm to the marketing goals or outcomes. This is not the case.

⁵⁶ Ghose Report § IV.A.

⁵⁷ Ghose Report ¶43 Fig. 5.

⁵⁸ Opening Report ¶¶ 43-92.

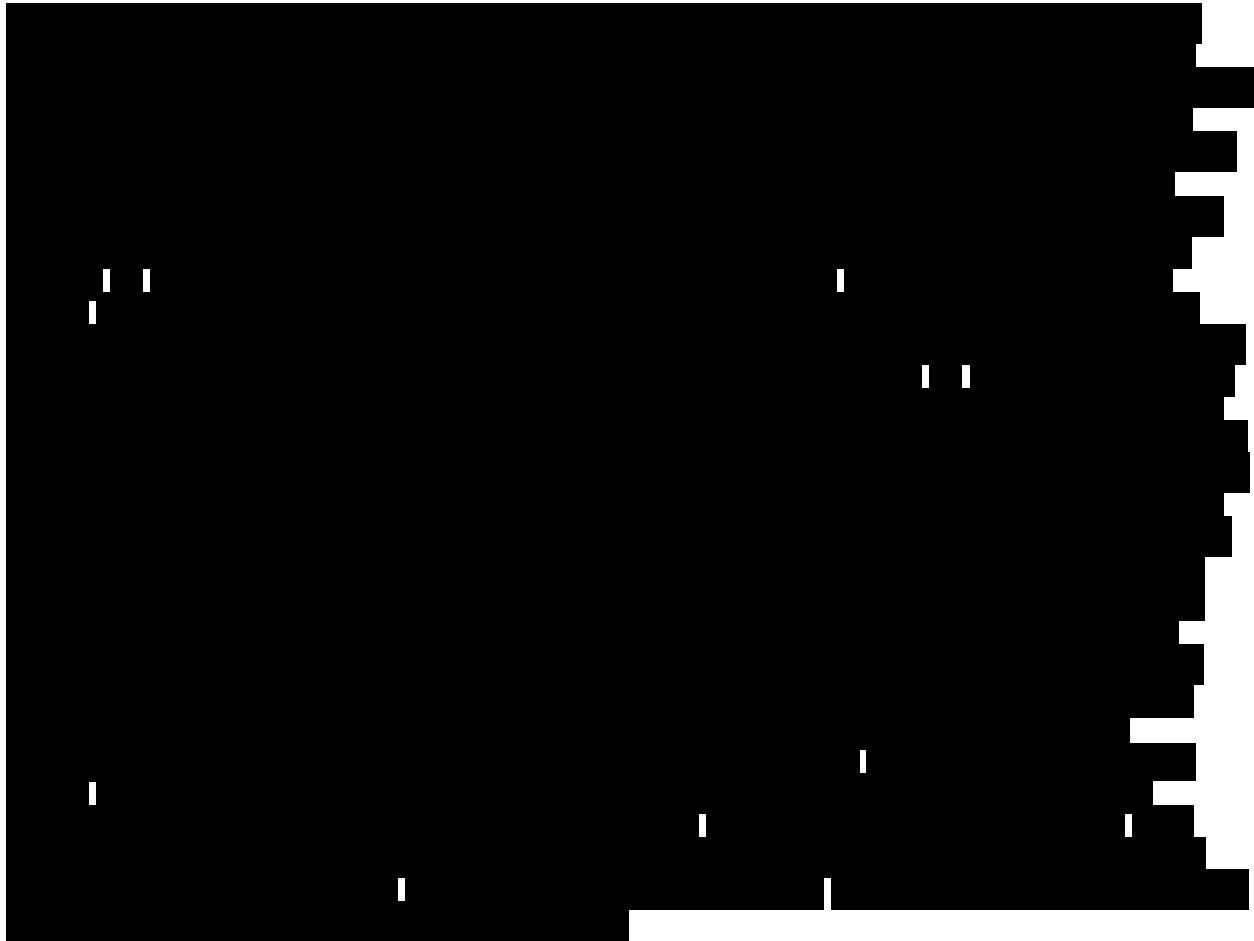
⁵⁹



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marketing strategies that appeal both to different kinds of consumers, and to different audiences at different parts of the marketing funnel.⁶⁰ Open web display advertisements are typically used to help build brand awareness and appeal to new consumers.⁶¹

55. Historical evidence bears this out. I have included below a 2018 marketing program provided by [REDACTED].⁶² The marketing funnel is



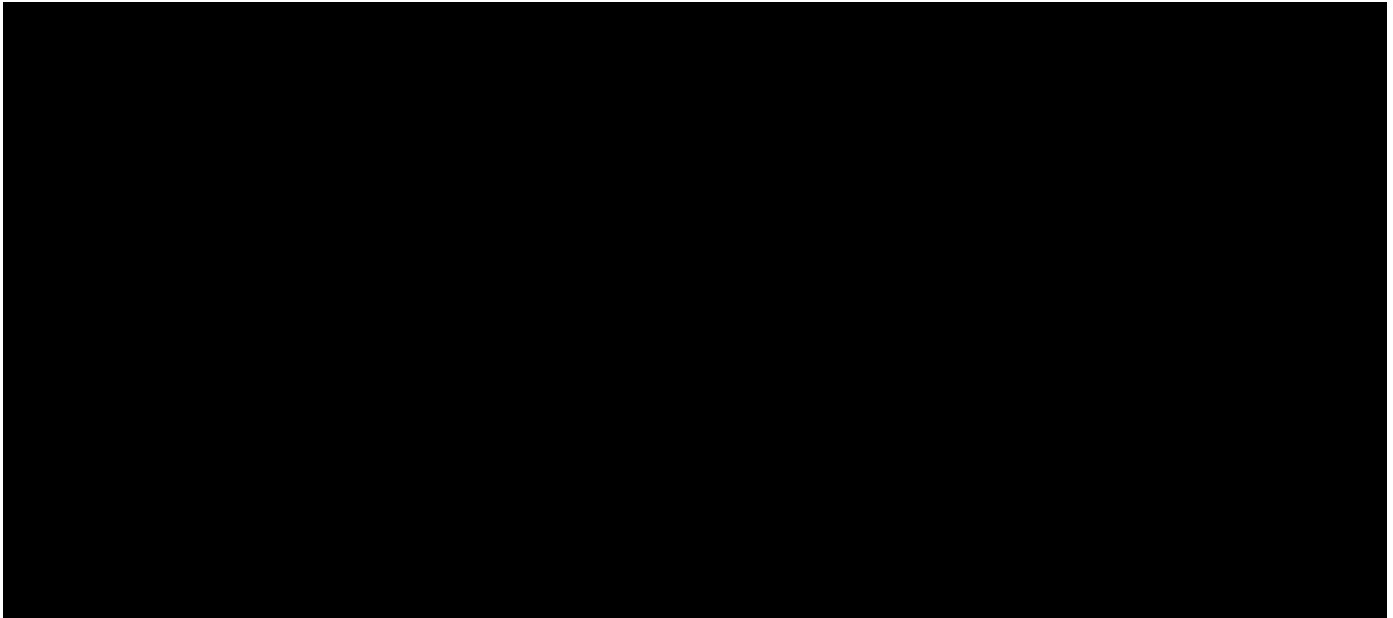
⁶⁰ Amazon Advertising. “Marketing Funnel.” Accessed on August 26, 2024. <https://advertising.amazon.com/library/guides/marketing-funnel>; Semrush. “Marketing Funnel.” Accessed on August 26, 2024. <https://www.semrush.com/blog/marketing-funnel/>.

⁶¹ [REDACTED]

⁶² [REDACTED]

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used to distinguish marketing approaches for customers at different levels of conversion, as well as the preferred targeted channel to use:



56. Whereas a large group of identical advertisements in the same format can create oversaturation,⁶³ a set of advertisements for the same marketing objective in different formats can help lead consumers through the purchase journey.⁶⁴ In his own research and in his book *TAP: Unlocking the Mobile Economy* (“TAP”), Dr. Ghose cites a study that found that “consumers who reside in different stages of the AIDA funnel path exhibit substantially different thresholds for annoyance stimulation.” As he explains,

[C]onsumers who are in the “awareness” stage can be annoyed with as few as three display advertising exposures on the same day. In contrast, consumers who are in the “interest” state would have to be exposed to

⁶³ Craig, C. S., Sternthal, B., & Leavitt, C. “Advertising Wearout: An Experimental Analysis.” *Journal of Marketing Research*, 13(4), 365-372 (1976). <https://doi.org/10.1177/002224377601300406>.

⁶⁴ Huang, Lei, Xianghua Lu, and Sulin Ba. “An Empirical Study of the Cross-Channel Effects Between Web and Mobile Shopping Channels.” *Information & Management*, vol. 53, no. 2, 2016, pp. 265-278. <https://doi.org/10.1016/j.im.2015.10.006>.

(<https://www.sciencedirect.com/science/article/pii/S0378720615001226>). (“Using the 2½-year transaction data obtained from an e-commerce company that expanded its web service onto a mobile platform, we investigated the impact of the newly introduced mobile channel on the sales of the incumbent web channel, and whether it could stimulate new consumption from consumers. Our empirical results indicate that after the adoption of the mobile channel, the purchases on the web channel were slightly cannibalized; however, the consumers’ purchases increased overall, suggesting that the positive synergy effect of the new channel overrode the negative cannibalization effect.”)

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seven display advertising exposures on the same day to reach a state of annoyance.⁶⁵

57. There is a longstanding set of studies that explore the complementarity of different advertising formats.⁶⁶ Dr. Ghose himself offers an illuminating example in *TAP*, his own book. Suppose a potential customer abandons a product in a digital shopping cart, but then appears near the brick-and-mortar store. Dr. Ghose suggests that a business with a cross-channel presence that wants to retarget this consumer might be able to show a relevant social media ad on Facebook while the customer is near the brick and mortar store.⁶⁷ This example describes a multi-channel strategy that recognizes that marketers can leverage different channels precisely because they are appealing to different consumer goals.⁶⁸

58. In Chapter 12 of *TAP*, “Tech Mix: Solving Wannamaker’s Riddle,” Dr. Ghose turns to a famous anecdote to illustrate the problem of how to choose between channels. As he recalls, in the nineteenth century, the merchant John

⁶⁵ Ghose (2017) at 92.

⁶⁶ Donnelly, C., Simmons, G., Armstrong, G., & Fearne, A. “Digital Loyalty Card ‘Big Data’ and Small Business Marketing: Formal Versus Informal or Complementary?” *International Small Business Journal*, 33(4), 422-442 (2015). <https://doi.org/10.1177/0266242613502691>.

⁶⁷ Ghose (2017) at 35.

⁶⁸ [REDACTED]

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Wannamaker famously said, “Half the money I spend on advertising is wasted; the trouble is, I don’t know which half.”⁶⁹ Again, for Dr. Ghose, when marketers face the challenge of figuring out how to allocate advertising, they face “a dense fog.”⁷⁰ Far from expressing clarity about how to allocate spending, the Ghose Report ignores that allocation is a challenging and multifaceted problem.

59. Dr. Ghose argues that the best way to proceed is with an “omni-channel” approach. As he writes,

Consumers today spend time on multiple devices (or multiple screens) and this sort of multi-homing creates an inter-dependency between devices that firms can tap into. Second, consumers are exposed to multiple ad messages in different ad formats for the same brand across different channels at different points in time in their path to purchase. This creates potential omni-channel synergies. These two dimensions of tech mix influence consumers’ behavior in non-trivial ways and have made digital attribution the holy grail of advertising.⁷¹

60. It is my opinion that the Ghose Report’s description of this approach is decidedly about complementarity across channels, rather than substitutability. In fact, the entire premise of omnichannel marketing, a premise Dr. Ghose embraces,⁷² undercuts the Ghose Report’s simplistic points about fluidity, substitutability, and interchangeability. In the fictive, i.e., theoretical and academic, world that the Ghose Report lays out, there is no need for omnichannel strategy. Instead, marketers would simply estimate the efficacy of marketing via ROI and allocate the entirety of their budget to this strategy. I have virtually never seen these types of budget shifts in practice.

61. The Baye Report mistakenly contends that, for advertisers, the costs of switching channels are effectively insignificant (he argues that it is “likely *de*

⁶⁹ Ghose (2017) at 159.

⁷⁰ *Ibid.*

⁷¹ *Ibid.* at 160.

⁷² Examples of papers that Dr. Ghose collaborated on that embrace omnichannel marketing: Cui, T. H., Ghose, A., Halaburda, H., Iyengar, R., Pauwels, K., Sriram, S., ... & Venkataraman, S. “Informational Challenges in Omnichannel Marketing: Remedies and Future Research.” *Journal of Marketing*, 85(1), 103-120 (2021); Sun, C., Adamopoulos, P., Ghose, A., & Luo, X. “Predicting Stages in Omnichannel Path to Purchase: A Deep Learning Model.” *Information Systems Research*, 33(2), 429-445 (2022); Cui, H. T., Ghose, A., Halaburda, H., Iyengar, R., Pauwels, K., Sriram, S., ... & Venkataraman, S. “Omnichannel marketing: The challenge of data-integrity.” *Northeastern U. D’Amore-McKim School of Business Research Paper*, (3460580) (2019).

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minimus,”⁷³), therefore rendering distinctions between channels insignificant. The Baye Report mistakenly argues that switching advertising channels comes at a minimal cost. Like his counterparts, the bases for his opinions are theoretical, whereas in practice, marketers do not so easily switch from one channel to another. Digital marketers specialize in different forms of advertising.⁷⁴ It is not simply a matter of switching what kinds of ads a company places, although the difference between producing a text ad and a video ad is substantial. It is also a matter of learning how different ads work. The fact that individual advertisers buy ads in different advertising channels does not make those ads interchangeable. The fact that individual advertisers buy ads in different channels does not imply that they easily switch to other channels or configurations of channels.

62. Similarly, the Baye Report mistakenly argues that publishers can easily sell the same ad inventory for different channels and in different kinds of deals (i.e., direct vs. programmatic).⁷⁵ He argues that because publishers can earn revenue from different kinds of ads, they can “shift focus for content creation to other types of properties (e.g., in app content or CTV rather than websites) if advertiser demand shifts to those channels.”⁷⁶ The Baye Report states that the fact that both advertisers and publishers transact ads across a variety of channels and formats indicates the “ease of substitution”⁷⁷ for both groups. This contention about publishers is nonsensical.⁷⁸ Google launched Google Plus in an explicit attempt to enter the search advertising marketing. That effort, despite starting by opting in all Gmail users and beginning with hundreds of millions of users, failed.⁷⁹ The idea that a publisher could cavalierly change channels is risible, thanks to the barriers to entering a new channel.

⁷³ Baye Report ¶ 46.

⁷⁴ Flavin, B. “11 Types of Marketing Specializations: The Practical Guide.” Rasmussen University, January 4, 2021. Accessed on August 30, 2024. <https://www.rasmussen.edu/degrees/business/blog/types-of-marketing-specializations/>.

⁷⁵ Baye Report ¶ 47.

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ Publishers must have both the inventory and the infrastructure to support new channels. To sell search ads, a publisher must control a large-scale search engine. To sell instream video ads, a publisher must have video content, which is watched at scale, where the ads can run. Changing channels is not an option for almost all publishers, which is why all of them, including the very largest, show some degree of specialization.

⁷⁹ Perez, Sarah. “Looking Back at Google+.” TechCrunch, October 8, 2018. Accessed on August 26, 2024. <https://techcrunch.com/2018/10/08/looking-back-at-google/>.

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63. Again, the fact that advertisers and publishers transact across different kinds of channels and formats does not imply that it is easy to substitute one form for another for either group. Far from it. Both advertisers and publishers must take into account their expertise and infrastructure in making shifts to their buy side and sell side positions, as I describe above.

64. The Simonson Report agrees with me that social media is distinct from display. The Simonson Survey differentiates social media from display.⁸⁰ Distinguishing these channels is essential in a survey that is intended to be answered by marketing professionals, who would be baffled by the inclusion of social media within display. I will elaborate on problems with the Simonson Survey methodology below.

C. Category One Error Related to Misunderstanding Marketing Optimization

65. Dr. Ghose's marketing experience, confined as it is to academia and research, causes him to misapprehend the nature of media optimization in marketing practice.⁸¹ (See Section IV of his report.) The Ghose Report makes the argument that advertisers are able to optimize advertising campaigns in accordance with return on investment ("ROI"). The Ghose Report claims that advertisers' placement choices have become more fluid with increased ease of measurement.⁸²

66. The Ghose Report offers a chart of different possible pathways to a display ad transaction.⁸³ Many of the ways that the Ghose Report theorizes that marketers can shift pathways in the course of placing ads simply do not reflect practice. The claims of the Ghose Report are merely theoretical in nature and untethered from financial reality. While this kind of multiple path fluidity can be conceived in theory, it is not an industry pattern.

67. Part of the Ghose Report's argument is based on the idea that multi-channel measurement has become easier to the point of making multi-channel optimization a simpler problem to solve for marketing operations of all stripes and sizes.⁸⁴

⁸⁰ Expert Report of Itamar Simonson, Ph.D. n. 4, July 30, 2024. ("Simonson Report").

⁸¹ Dr. Ghose's CV (Ghose Report Appendix A) is 49 pages long and lists no employment in a marketing firm.

⁸² Ghose Report § IV.

⁸³ Ghose Report ¶ 291 Table 2.

⁸⁴ Ghose Report ¶ 111.

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68. Multi-channel measurement is an extraordinarily difficult challenge. Advertising firms are not ideal theoretical spaces in which advertisers play out optimal responses. Advertisers operate with a wide range of skill levels for analysis, with very few capable of the kind of optimization analysis that the Ghose Report posits. Even with a highly skilled team, multi-channel measurement is the kind of problem that is deeply complex and difficult, as I have detailed in my Opening Report.⁸⁵

69. It is perhaps not surprising therefore, that in *TAP*, once again, Dr. Ghose contradicts the opinions expressed in the Ghose Report. In his book, Dr. Ghose himself refers to the problem of multi-channel measurement as a “dense fog.”⁸⁶ When Dr. Ghose envisions advertising firms making a decision calculus, he asks “What should a firm do?” Then he goes on, writing “I believe the answer, though a cliché, is ‘It’s complicated.’ ”⁸⁷ Again, we see that Dr. Ghose’s own reasoning contradicts the Ghose Report.

70. It is my opinion that the Ghose Report conflates the art of the theoretically possible with marketing practice. The report fails to appreciate or acknowledge the heterogeneity of advertiser experience, resources, sophistication, and the analytical complexity of multi-channel analysis, which leads him to a Pollyanna view of optimization.

71. The Milgrom Report makes similarly flawed academic arguments about the potential for campaign and budget optimization that simply do not align with practice. First, the Milgrom Report assumes high levels of sophistication among all advertisers and publishers.⁸⁸ In reality, advertising sophistication mimics advertising budgets and is a power-law distribution. The Milgrom Report argues that in order to optimize advertising campaigns, many advertisers “contract with specialized intermediaries (such as advertising agencies).”⁸⁹ It goes on to state that

Some advertisers and publishers even employ teams of engineers, economists, and marketing experts devoted to maximizing returns by finding all possible improvements in advertising yields. And even though advertisers and publishers do not in all cases perfectly optimize

⁸⁵ Opening Report ¶¶ 254- 315.

⁸⁶ Ghose (2017) at 159.

⁸⁷ Ghose (2017) at 174.

⁸⁸ Expert Report of Paul R. Milgrom ¶ 57, July 30, 2024. (“Milgrom Report”) (“intermediaries that serve publishers and advertisers compete for business by offering optimization tools, so that even smaller advertisers and publishers have access to sophisticated tools to optimize performance.”)

⁸⁹ Milgrom Report ¶ 30.

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their returns from display advertising, it is common for them to conduct experiments and learn to adjust their bidding and/or floor pricing strategies, which tends to bring them closer over time to the equilibrium benchmark.⁹⁰

The Milgrom Report makes similar remarks when he opines that

Advertisers leverage key performance indicators to guide their campaign strategies on buy-side tools and bid effectively. Rather than calculating bids themselves, advertisers delegate many of the details of bid optimization to specialized buy-side tools or agencies, while optimizing their campaign parameters to achieve higher click-through rates, conversion rates, or return on ad spend. Microsoft research on advertiser behavior has concluded that “[a]nalytics play an increasing role as advertisers look to quantitative measure[s of] campaign success,” with advertisers being “obsessed with incrementality and optimizing.” Similarly, Michael Shaughnessy, the Chief Operating Officer at the global advertising agency Kargo, has testified that “marketers will want to make sure they are getting their return on investment and they’ll recalibrate their campaigns and their tactics to deliver in the best environment to execute on their objectives.”⁹¹

72. This reasoning is representative of how the Milgrom Report conceives of the process of optimization for advertisers. The Milgrom Report uses the language of an economist rather than a marketer. He imagines a world in which all marketers have access to teams of analysts solely dedicated to solving the problem of optimization. His report relies on the reasoning of large advertisers and imagines a world where marketers are obsessive optimizers.⁹²

73. In practice, campaign optimization is a much more complex process.⁹³ As I describe extensively in my Opening Report, the modern marketing optimization

⁹⁰ Milgrom Report ¶ 30.

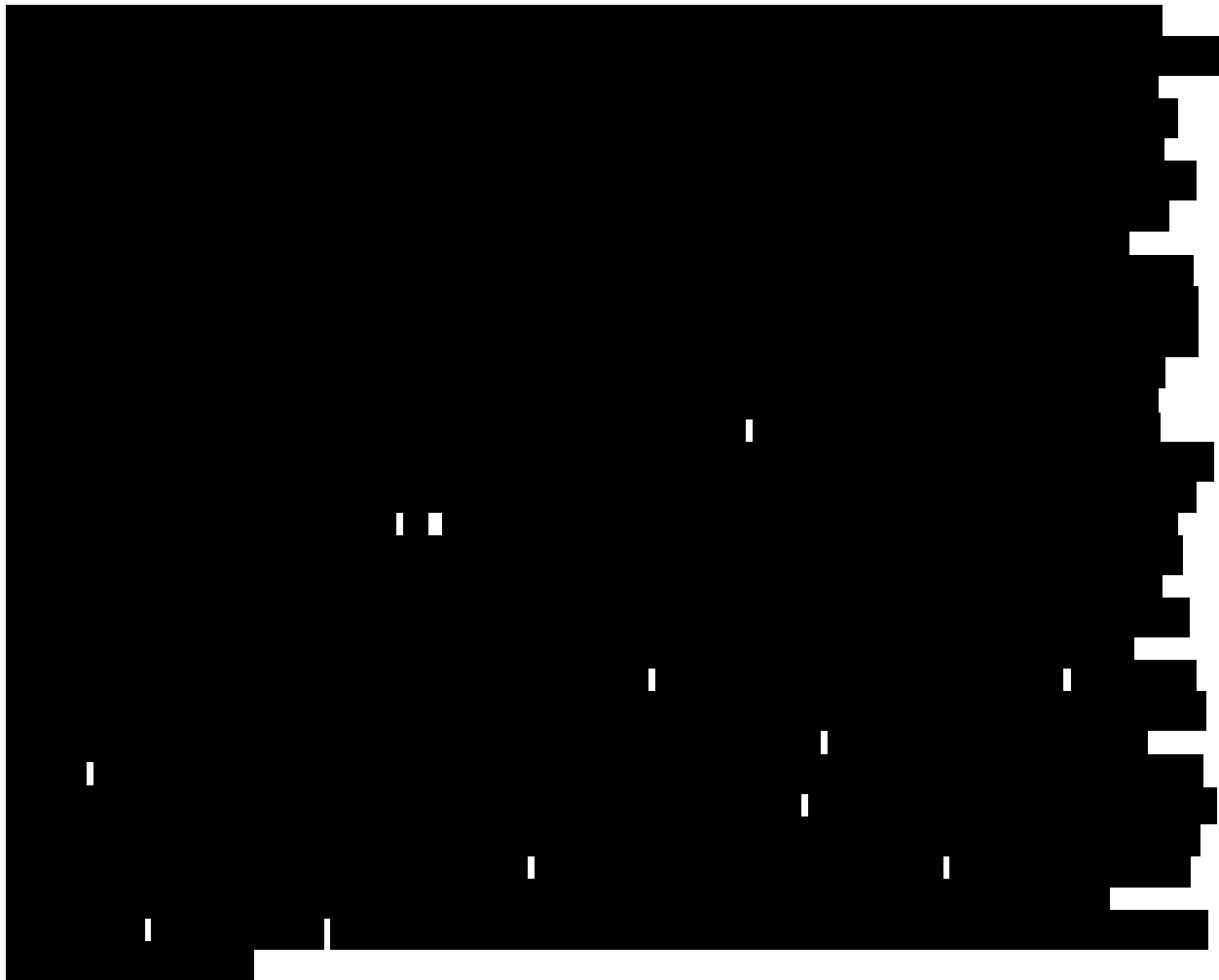
⁹¹ Milgrom Report ¶ 32a.

⁹² Over the last twenty-five years I have worked with hundreds of advertisers at all imaginable scales. I do not disagree with Dr. Milgrom’s quotation that “analytics plays an increasing role” or that marketers are “obsessed with incrementality and optimizing.” These statements are true and part of the reason I designed our MS in Business Analytics to support these business functions. But a desire to operate in a certain way (i.e., with a hyper-focus on numerical results) does not imply that this is how the industry actually works. When marketers are developing media plans, they have many concerns beyond simple ROI: brand safety, audience reach, reach to specific audience segments, platform transparency, optimal frequency levels, alignment with brand values, ad fraud prevention, and long-term brand equity. Additionally, they need to weigh factors such as creative impact, the competitive landscape, and compliance with privacy regulations.

⁹³ [REDACTED]

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suite typically includes multi-touch attribution (“MTA”), media mix modeling (“MMM”), and experimentation.⁹⁴ I have worked with hundreds of advertisers using MTA, scores using MMM, and run hundreds of online experiments.⁹⁵ These measurement approaches are difficult to implement, resource intensive, and often yield nuanced and contradictory insights that must be synthesized into optimization



⁹⁴ Opening Report ¶¶ 268-269, 304-305.

⁹⁵ In 2020, I worked with an entertainment company spending over \$5 billion on marketing annually. This firm had a nascent experimentation practice; a robust MMM solution in one business division that was unavailable to other, much larger divisions; and an expensive and inaccurate MTA implementation based partially on legacy technology from a vendor. As part of my work, I helped the firm overhaul their experimentation practice (and the tracking of these experiments), deploy their MMM technology across divisions to allow for resource allocation decisions, and reconfigure their MTA approach. This firm represents the acme of large-scale marketing performance measurement and fell well short of the standards that the Milgrom Report assumes are commonplace in the industry.

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decisions. The Milgrom Report confuses desire to optimize with the resources and skills to do so effectively.

74. Second, the Milgrom Report argues that confidentiality in Google's bidding algorithm is standard and beneficial, which underestimates the impact on smaller players.⁹⁶ The Milgrom Report's analysis of the benefits of Google's various programs for its customers speaks in the aggregate of publishers and advertisers, as though the ostensible benefits are available to all alike, regardless of resources.⁹⁷ The Milgrom Report's analysis does not account for the significant differences in resources between large and small advertisers.⁹⁸ Nor does he acknowledge the difficulty of ascertaining the algorithms for each of their iterations and each of the different programs. Small advertisers, especially, do not have the extensive resources, described above, to find their way in the many iterative programs Google developed and repeatedly changed. Algorithmic confidentiality is far from beneficial for everyone except, possibly, Google.⁹⁹

VI. Category Two: Erroneous Blurring of Antithetical Experimentation Practices

75. Google conducts its experiments in several ways that depart with what is commonly accepted within the advertising industry. It is standard for companies to absorb the costs of their experiments and transparently communicate with their clients, and Google deviates sharply from this norm. By subjecting its clients to experiments without their knowledge, Google not only imposes hidden costs but also creates a powerful information imbalance. Google's customers expect auctions to be fair and experiments disclosed, and in many cases they are neither.¹⁰⁰

⁹⁶ Milgrom Report § IV.D.6.

⁹⁷ Milgrom Report ¶¶ 18-20.

⁹⁸ Small advertisers and large advertisers differ in both kind and degree when discussing marketing measurement and analytics. Most large advertisers have teams, or employ agencies with such teams, responsible for managing the individual marketing channels within a marketing portfolio. In contrast, small advertisers typically have marketing budgets allocated by people who are responsible for many tasks including marketing. These individuals do not have the resources or specialized knowledge necessary to engage in sophisticated marketing measurement.

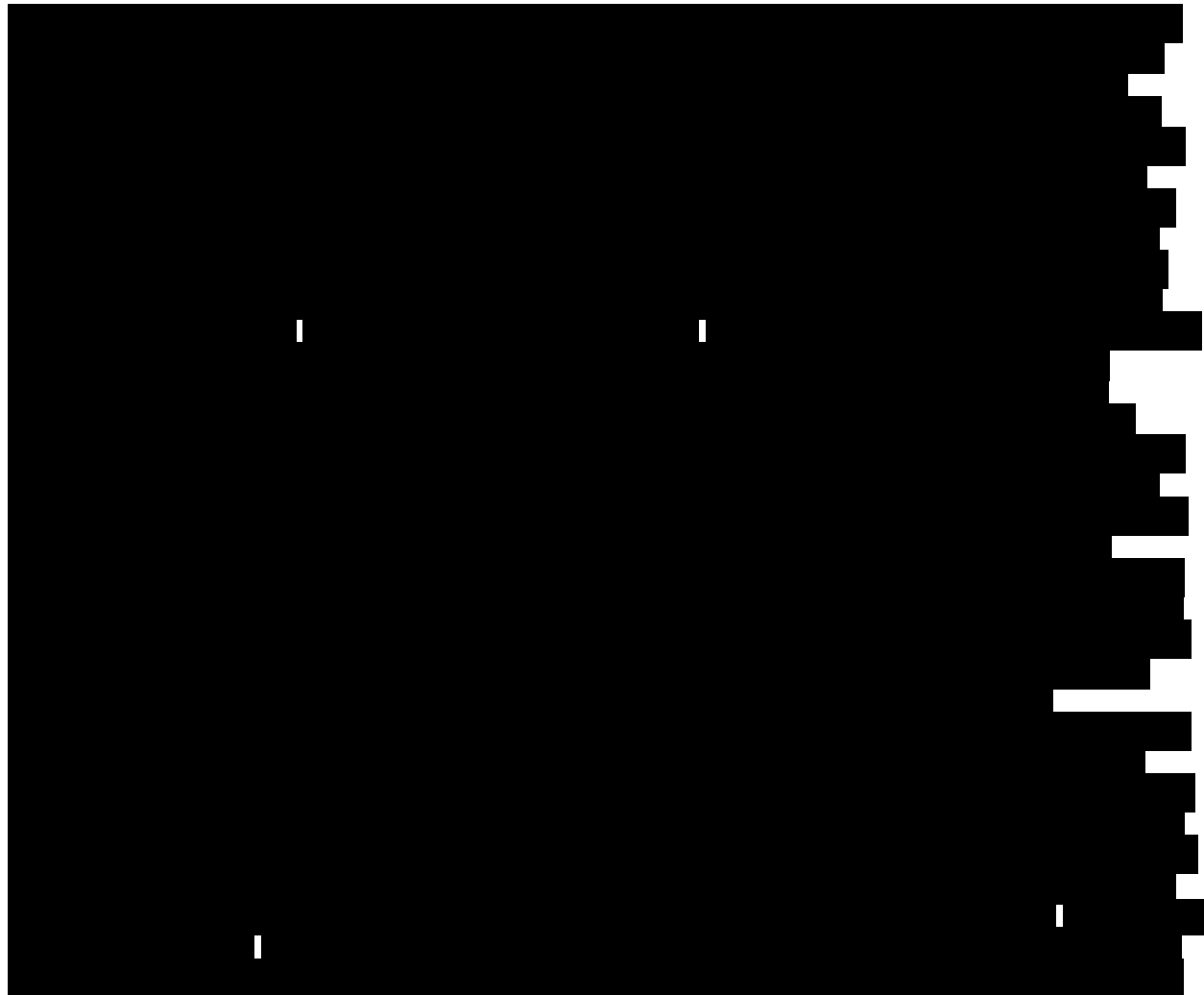
⁹⁹ *E.g.*, GOOG-AT-MDL-001462938 (Internal Google email re: "Possible HBM leak", April 2022, "while HBM is not supposed to be noticeable by bidders, it appears Criteo regularly runs GAM reports (via the GAM reporting API), which we had not accounted for"; "Are there other bidders with access to the GAM API that could notice?"; "It's possible that a few other bidders have GAM pub credentials and use the API (eg AMZN, TTD) but I would suggest we only message reactively if they notice.")

¹⁰⁰ [REDACTED]

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76. Google's auction manipulations¹⁰¹ created an unlevel playing field for the participants. Google would pick winners and losers in the marketplace, sometimes tilting outcomes toward advertisers, sometimes toward publishers, but always maintaining their margins. All participants, regardless of their place in the market, worked under a fog even denser than that imagined by Dr. Ghose in his book. In that work, he describes the difficulty measuring marketing outcomes and allocating resources. But his description assumes a world where advertisers are participating in an environment with rules they know.

77. When I was at Microsoft, I spent roughly a year modeling price floors for our "owned and operated" inventory. I was also responsible for using our data to build models to estimate the value of external impressions we saw and had the opportunity to bid on. This inventory would be made available on AdECN, the exchange Microsoft acquired in 2007, and later on AppNexus, now Xandr. On several occasions I



¹⁰¹ Opening Report § X.

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participated in meetings where we discussed the tactics surrounding inventory we were purchasing on DoubleClick Ad Exchange, now AdX. I explained that, as far as I knew, a sealed-bid second-price auction allowed us to bid our true estimate value of the impression.

78. These manipulations taint auctions.¹⁰² When an advertiser learns that the auction dynamics are being manipulated, the insights gleaned from past auctions become suspect and the road map forward into new auctions becomes unreliable. As I discuss below, the Milgrom Report paints a rosy and unrealistic picture of auction participants being able to discover optimal bidding practice. Dr. Wiggins absorbs Google's manipulations into some fictive "learn by doing" opportunity for the victims. Both contentions are misguided and fail to appreciate the way in which the "dense fog" of marketing measurement, overlaid on Google's auction-dynamic quicksand, created unfair¹⁰³ conditions for auction participants.

79. The opaque nature of Google's experimentation makes it nearly impossible for advertisers and publishers to adapt or learn from their experiences.¹⁰⁴ Dr. Wiggins's assertion that clients can "learn by doing" fails to account for the reality that Google's constant algorithmic changes prevent any meaningful learning from taking place. This creates a scenario where clients are effectively operating in the dark, unable to discern the factors behind their successes or failures.

80. Furthermore, Google's expert reports, particularly the Ghose Report, do not sufficiently acknowledge the massive data asymmetry between Google and its clients.¹⁰⁵ This oversight leads to flawed conclusions, such as the erroneous belief that access to modern analytics tools somehow levels the playing field. The tools available to most advertisers are inadequate for deciphering the opaque and ever-changing environment that Google controls.¹⁰⁶

¹⁰² I am using "taint" in the sense that the information gleaned from an auction is unreliable in analyzing past campaigns or building models, even mental ones, to predict future auction behavior.

¹⁰³ Opening Report § IX.D.

¹⁰⁴ Opening Report ¶¶ 344-360.

¹⁰⁵ This information asymmetry will be discussed more fully in VI.D.

¹⁰⁶



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A. The Ghose Report Confuses Different Types of Experiments

81. The Ghose Report offers extensive comments about Google's use of experiments in its display marketing business activities.¹⁰⁷ It is a common practice for advertisers to conduct experiments on the efficacy of their marketing and common for publishers to run A/B and multifactorial tests to assess the impact of site changes on revenue or ad views. The way that the Ghose Report construes the practice of experimentation in the industry, however, does not conform with industry practice in several respects. The effect of the Ghose Report's construal is that it exonerates, by attempting to normalize, predatory experimental practices.

82. First, when marketing companies conduct experiments, they typically absorb the costs of those experiments rather than transferring them to their customers.¹⁰⁸

83. Google, by contrast, allowed its customers to be subject to experiments and reaped the rewards for those experiments.¹⁰⁹ And, while the customers may have sometimes been aware of the existence of the experimentation, the details of the experiments were not disclosed.¹¹⁰ Informed consent is a central tenet of experimentation.¹¹¹ In many cases, Google's customers were not aware of the

[REDACTED]

¹⁰⁷ Ghose Report § V.

¹⁰⁸ Examples of experiment practices by marketing companies conducting experiments in a normal way, contra Ghose: Harvard Business Review. "Marketers Underuse Ad Experiments—That's a Big Mistake." Accessed on August 27, 2024. <https://hbr.org/2020/10/marketers-underuse-ad-experiments-thats-a-big-mistake>. ("Firms that do experiment tend to run more than one experiment in a year, averaging 15 experiments per firm in e-commerce and close to 50 in the travel sector, and typically invest about 10% of their overall advertising budget in experimentally measured campaigns."); Bain & Company. "Can Marketing Experimentation Become Your Superpower?" Accessed on August 27, 2024. <https://www.bain.com/insights/can-marketing-experimentation-become-your-superpower/>; SlideShare. "Marketing Research Design." Accessed on August 27, 2024. <https://www.slideshare.net/slideshow/marketing-research-design/8539582>.

¹⁰⁹ GOOG-NE-06842715 (Internal Google communication re: "AdX Auction Optimizations – gTech – Publishers", May 2016, on "why we need to communicate"; "DoubleClick Ad Exchange has been positioned as 'transparent' until now,"; "Buyer scrutiny may lead to external discovery and uncontrolled press coverage,").]

¹¹⁰ GOOG-AT-MDL-007397182; GOOG-DOJ-13989756; GOOG-AT-MDL-B-004435235.

¹¹¹ For instance, the NIH Guidelines for Ethical Research. Accessed on September 4, 2024. <https://www.nih.gov/health-information/nih-clinical-research-trials-you/guiding-principles-ethical-research>.

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experiments to which they were subject.¹¹² Moreover, Google went out of their way to hide their activities.¹¹³

84. Thus, it remains my opinion¹¹⁴ that Google's practices with experiments are secretive and create singular and powerful, informational asymmetries. The result is that Google's customers on both the buy side and sell side, including agencies, advertisers, and publishers, are left guessing, and they are not privy to changes in the rules.

B. Dr. Wiggins Draws Erroneous Conclusions from a Fictive “Learn By Doing” World

85. The opaque and changing quality of the rules of Google's auction environment bears on Dr. Wiggins's reasoning. Dr. Wiggins contends that both advertisers and publishers learn to adapt to the ad tech environment by a kind of trial and error process—what he refers to as “learn by doing.”¹¹⁵ While many

¹¹²



¹¹³ GOOG-DOJ-13997420 (email from [REDACTED] re: “Re: [Follow up] RPO Comms (03/16/2015),” April 14, 2015, “I think our sales teams are still concerned that if they’re hard pressed by clients on whether or not these are systemic changes to AdX auction dynamics, they don’t have a whole lot that they can say, right?” and “...and the fact that we denied we were doing this after the recent leak went out in that Digiday article.”)

¹¹⁴ Opening Report, ¶¶ 346-347.

¹¹⁵ Expert Report of Professor Steven N. Wiggins §§ II.B.1-3, July 30, 2024. (“Wiggins Report”).

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advertisers do learn from practice, the environment that Google creates makes this kind of learning nearly impossible or incredibly expensive.

86. Since Google's customers do not know the rules of the game that Google is playing by, they cannot have any consistent basis on which to learn by doing.¹¹⁶ If, one day, an advertising strategy works well, but auction by auction, the rules of how ads are placed changes in Google's auction environment, there is simply no way to learn what is causing success or failure. Moreover, Google worked hard to obscure their changes to the system.¹¹⁷ In precisely the case he was asked to assess, Dr. Wiggins's arguments are completely mistaken.

87. In internal emails, Google employee [REDACTED] notes that Google's "algorithming" is what sets it apart from other businesses. To be clear, the experimentation and algorithmic enhancements that Bellack describes were desired by other players in the industry. But few have resources to do this kind of work.¹¹⁸

¹¹⁶ [REDACTED]

¹¹⁷ GOOG-DOJ-15432090 (Internal Google emails re: "Including third-party reserve prices to RTB buyers," September 2016. "catch the upswing towards halloween and can 'mute' the negative impacts on any buyers..."); GOOG-DOJ-13997420 (email from [REDACTED] re: "Re: [Follow up] RPO Comms (03/16/2015)," April 1, 2015, "Several sales people, but [REDACTED] especially, are very concerned that our comms make it sound like this change is still an experiment when it is actually a change that we are rolling out across all of our traffic. They don't think we should be throwing this under the rug of experiments we're running to optimize publisher yield and that we should be more up front about it being a change that has rolled out across AdX.")

¹¹⁸ In 2010, I was responsible for "algorithming" price floors for billions of impressions released into DoubleClick Ad Exchange, now AdX, and AdECN. A typical analysis would begin with a series of meetings included 3–5 people with Ph.D.s and many other people with decades of marketing experience. Once we had formed a testable hypothesis, I would spend several weeks designing the analysis and preparing my code. The data collection phase of the analysis would typically take place

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The problems with the reasoning of the Wiggins Report become even clearer in light of Google's internal documents. In an email exchange concerning adjustments to AdX that will alter how much publisher inventory is filled, [REDACTED] expresses excitement at the ways that "algorithming" will increase profits. The team members in the email speak of making small adjustments that will yield greater profits for publishers (and, by implication, for Google). [REDACTED] says, "this kind of algorithming [sic] learning and innovation is what sets Google apart from the pack in so many businesses." [REDACTED] comments provide additional evidence to show how Google's tinkering with the different facets of its auctions, for greater profit, continually leaves the state of the auction in flux.¹¹⁹

C. The Milgrom Report Makes Unsupported Statements about the Ability of Smaller Advertisers to Experiment

88. Many of the kinds of potential patterns that larger entities can try to discern, are simply inaccessible to smaller advertisers.¹²⁰ The Milgrom Report treats all sizes of advertisers as virtually the same, but smaller advertisers are not operating at a scale that makes discerning shifts (hard and often impossible even at scale) possible.¹²¹

89. The Milgrom Report does not acknowledge that it is impossible, in most cases, to learn from transactions with Google. I have discussed similar points about Dr. Wiggins's report. Without access to Google's changing algorithms and repeatedly changing programs, most advertisers did not have the information or resources to discern cause and effect. Advertising is notoriously hard to measure.¹²²

on a supercomputing cluster with 50,000 CPUs and process several million gigabytes of data. A substantive revision to these models cost millions of dollars.

¹¹⁹ GOOG-NE-13293533—at 533.

¹²⁰ See, e.g., Milgrom Report ¶ 30. ("...advertisers and publishers even employ teams of engineers, economists, and marketing experts devoted to finding all possible improvements in advertising yields."). Smaller advertisers are unlikely to have teams of engineers, economists, and marketing experts devoted simply to optimization.

¹²¹ Marketing budgets range from 2% to 10% of revenue. See, Forsey, Caroline. "Marketing Budget: How Much Should Your Team Spend in 2024? [By Industry]." HubSpot Blog, April 1, 2024. Accessed on August 28, 2024. <https://blog.hubspot.com/marketing/marketing-budget-percentage>. There are millions of small businesses that make up over \$4T of the US economy. See, Ferguson, Stephanie, Makinzi Hoover, and Isabella Lucy. "Small Business Data Center." U.S. Chamber of Commerce, May 20, 2024. Accessed on August 28, 2024. <https://www.uschamber.com/small-business/small-business-data-center>. These are companies whose marketing spending is in the thousands of dollars per year.

¹²² Reiley, David H., and Lewis, Randall A. "Down-to-the-Minute Effects of Super Bowl Advertising on Online Search Behavior." (February 27, 2013). <https://ssrn.com/abstract=2227122>; and, Lewis,

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Understanding the impact of marketing is like trying to measure the weight of a feather in the pouch of a kangaroo jumping up and down on a scale. Google's machinations further obscured that weight, to Google's profit.

90. Furthermore, the Milgrom Report, along with the Ghose and Baye Reports, tends to treat attempts at experiments on the part of Google as equivalent to experiments on the part of its customers, both advertisers and publishers. The Milgrom Report does not acknowledge the significant power differences between Google's experiments to change its own auctions, on the one hand, and experiments that advertisers and publishers might conduct to try to optimize their own strategies, on the other.¹²³

91. In my experience with numerous advertisers and publishers, I have observed repeatedly that advertiser and publisher experiments are often conducted in order to try to ascertain what kind of auction environment one is working in, and what kind of strategies will succeed in that environment.¹²⁴ In contrast, Google's experiments involve changing its algorithms to improve its own profits and, in some cases, to shield it from being discovered for engaging in conspicuously predatory practices.¹²⁵

92. Many participants in display advertising run experiments to develop strategies to maximize profits. For the experiments in this case, Google has inverted that relationship. Google saw header bidding as an existential threat and developed

Randall A., Rao, Justin M., and Reiley, David H. "Measuring the Effects of Advertising: The Digital Frontier." (October 2013). <https://ssrn.com/abstract=2338892>.

¹²³ To use a baseball analogy, the publishers and advertisers are experimenting with infield shifts and batting orders. Google is experimenting with facets of the industry like the stadia where games will be held, the number of strikes batters are allowed, and the account of outs.

¹²⁴ Compare Deposition of [REDACTED] (Google LLC 30(b)(6) representative), *The State of Texas, et al. v. Google LLC*, Case No. 4:20-cv-00957-SDJ (E.D. Tex.), April 26, 2024 at 142:5-13 ("Q: And you said earlier 'experiments.' And that is Google experimenting with live auctions happening its - - on its AdX platform. Right? A: Yes. Any launches were done with experi - - low-traffic experiments. That's super common in the industry and I believe well-understood."), with Deposition of [REDACTED], *The State of Texas, et al. v. Google LLC*, Case No. 4:20-cv-00957-SDJ (E.D. Tex.), May 1, 2024 at 148:5-12 ("Q. Okay. But in terms of the stated purpose of this change to remove the restriction on conducting experiments on live auctions, the stated purpose here in the second sentence, at least in part, is maximizing revenue, Do you see that? A: Yes. That's - that's one of the purposes in running these experiments.").

¹²⁵ GOOG-DOJ-32277385 (Internal Google emails re: "percentage experiments on adx auction changes," July 2014); GOOG-DOJ-27760500 (Internal Google presentation re: "Experimentation on Publisher Yield," July 2014); GOOG-DOJ-13932386 (Internal Google email re: "2016 - The year in DRX quality-impacting launches," February 2017).

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Exchange Bidding to counteract it.¹²⁶ Google developed their business strategies,¹²⁷ then ran experiments to merely ensure that the decisions they had already made were net positive to Google's revenue and to understand, but not eliminate,¹²⁸ the impact to their customers. Ultimately, it was the Network Bidding Agreement ("NBA") with Meta that allowed Google to fend off this [REDACTED] ¹²⁹

D. Defense's Expert Reports, Especially the Ghose Report, Do Not Acknowledge the Gross and Significant Data Asymmetry Between Google and its Clients

93. The Ghose Report does not acknowledge the extraordinary asymmetry between the kinds of data that Google has access to in developing its market strategies, and everyone else, including its clients and other would-be competitors. Google's ability to win by "algorithming" was bolstered by the data "moat" created by its various lines of business.

¹²⁶ GOOG-TEX-00090151 (email from [REDACTED] re: "Jedi+ + Go To Market," November 2, 2017. ("There was an understanding of the existential threat posed by header bidding, especially HB wrappers and from FB, AMZN, AOL, ect."); GOOG-NE-05311570 (email from [REDACTED] re "GSL Thoughts for Sell-Side Marketing Support," December 9, 2016 ("Need to fight off the existential threat posed by Header Bidding and FAN. This is my personal #1 priority. If we do nothing else, this needs to be an all hands on deck approach[.]").

¹²⁷ Deposition of [REDACTED], *The State of Texas et al. v. Google LLC*, Case No. 4:20-cv-00957-SDJ (E.D. Tex.), May 1, 2024 at 101:13-17 (discussing the steps in developing and implementing an experiment at Google, Q. Okay. So the third stage to implement a yield optimization idea is going to be live experiments using actual publishers and advertisers? A: Yes.)

¹²⁸ GOOG-DOJ-15432090 (Internal Google emails re: "Including third-party reserve prices to RTB buyers," September 2016. "catch the upswing towards halloween and can 'mute' the negative impacts on any buyers..."); GOOG-TEX-01022605 at 13 (Internal Google presentation re: "Repricing + 1P Auctions, GTM Leads Review," December 2018, the risk of some publishers experiencing yield impact with no ability to opt out is "High" and the planned mitigation is to ensure strategic publishers yield is maintained.).

¹²⁹ [REDACTED] GOOG-NE-10493536-538 (email from [REDACTED] re "Jedi Blue Open Bidding Deal") (Discussing the NBA—"Rationale for the deal: Partner's [Facebook] participation is critical for the success of Network Bidding (aka Open Bidding) program and a driver of revenue for Google...In Base Case, the deal directly translates to [REDACTED] of contribution margin [REDACTED] of gross revenue) over 4 years. This is all demand that would otherwise transact through our sell-side platforms generating near zero fees given mediation is free...For web inventory, we will move Partner's demand off of header bidding set ups and further weaken the header bidding narrative in the marketplace. These could translate to [REDACTED] of incremental Google Network gross revenue annually ([REDACTED] net) that we would not have seen otherwise. Conversely, lack of Partner's participation means on-platform inventory expected to move off-platform and we lose revenue/access/fairness/insight ([REDACTED] gross annually ([REDACTED] net))...opens a revenue opportunity worth up to [REDACTED] at scale."

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94. Detailed data is the lifeblood of successful display auctions and certain categories of data are especially valuable. For example, user data is highly valuable, and knowing specifics about the audience allows for more precise targeting.¹³⁰ User data may include details such as browsing history, purchase behavior, and user interests. Behavioral data, in the form of patterns and habits by the user, can be helpful in predicting future behavior.¹³¹

95. Publisher information also plays a crucial role. Awareness of which advertisers are typically allowed or blocked, along with historical price floors and performance metrics, can provide a strategic edge.¹³² Likewise, knowing a user's location data is a significant asset. Knowing exactly where a user is situated allows for extremely localized targeting, which can be particularly effective for businesses with geographically-specific offerings. Companies will go to great lengths to improve the quality of the data used for targeting.¹³³

96. In a world such as digital marketing, where data is power, participants in an auction who possess more data are better able to participate in the market. Participants with the types of information discussed above (e.g., location information, user information, publisher information) have a significant advantage in that auction over participants that lack the information. This benefits scales with the number of auctions; this data can be used to build better bidding models and to run more effective experiments.

97. The Ghose Report conflates types of user-data in his report.¹³⁴ Google's user data has no equal in the digital marketing world, combining data from Search, Gmail, Maps, YouTube, Android, and their advertising products. This volume and

¹³⁰ At DrivePM, I performed an analysis comparing different types of user information and the expected lift in conversion rate by targeting on that information. Using retargeting, the ultimate behavioral metric, had the lowest expected CPA. Detailed, advertiser-specific user segments were less efficient, almost by an order of magnitude. There were similar degradations in performance as advertisers moved to general, non-advertiser-specific segments and then to the basic metrics such as time of day or day of week.

¹³¹ Beales, H, The Vale of Behavior Targeting to Individual Targeting, 2009, accessible at https://www.researchgate.net/profile/Howard-Beales/publication/265266107_The_Value_of_Behavioral_Targeting/links/599ecee6fdcc500355d5af/The-Value-of-Behavioral-Targeting.pdf (accessed on September 7, 2024).

¹³² Opening Report ¶¶ 323-24.

¹³³ Enhanced data was a material part of the NBA for Meta. Any participant in AdX would have wanted the data ensured by the NBA, but only a company with Meta's financial resources, market clout, and relationship with Google was able to strike a deal like this. See [REDACTED]

¹³⁴ Ghose Report § VI.

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variety of data gives Google unequalled information about the viewers of ads. Google's competitors in publisher ad tools,¹³⁵ advertiser ad buying tools,¹³⁶ and exchanges¹³⁷ have no comparable sources of data and certainly do not have such data in-house, where they can use it with great latitude and, essentially, for free. Google holds a grossly disproportionate market share of information in display advertising, which it uses to its advantage.

98. The Ghose Report presumes that ad tech innovation will level the playing field. It argues, "advertisers of all sizes now have access to many modern marketing analytics tools." As the Ghose Report sees it, access to analytics tools "will close the data knowledge gap and place companies with mid- and small budgets on a more level playing field with large companies."¹³⁸ There are several problems with this analysis.

99. The first is that analytics tools, however accessible, do not assist most, if any, advertisers in discerning what is happening within Google advertising products.¹³⁹

100. The second problem is that the opinions of the Ghose Report simply do not reflect industry trends over the last decade. The story over the last decade has been consolidation and large players exiting the market.¹⁴⁰ I have experience with this. aQuantive was a direct competitor of DoubleClick through our respective acquisitions, and we grew our advertiser buying tools business from 5-10% market

¹³⁵ Milgrom Report, Table 1: Google's Competitors Developed Similar Product Features as Challenged Google Products. (The sell-side/publisher competitors listed are OpenX, AppLovin (formerly MoPub), Xandr, AppNexus, Disney, Magnite ("formerly Rubicon"), Comcast's FreeWheel, Equativ, and Meta.)

¹³⁶ *Ibid.* (The buy-side/advertiser competitors listed are Meta Audience Network, Criteo, The Trade Desk (TDD), MediaMath (before 2023), Yahoo DSP (formerly Verizon Media), Xandr, and Amazon..)

¹³⁷ GOOG-DOJ-11790760 at 764 (Internal Google presentation re: "Exchange Bidding Sell Side Update," June 14, 2018, competitors challenging Google's position as an intermediary: Amazon, AppNexus, Rubicon, OpenX, and Index.

¹³⁸ Ghose Report ¶ 111.

¹³⁹ The only tool that the Ghose Report mentions is audience measurement data from Nielsen, a product whose costs can easily run into the hundreds of thousands of dollars, undermining the case that they are "accessible". The tools that are truly accessible are those offered by companies like Google and Meta, though the latter is primarily focused on measuring the ROI of advertising on Meta's platforms. These tools, by design do not provide a level of granularity that would allow customers to discern changes to underlying algorithms.

¹⁴⁰ [REDACTED]

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share to 45% between 2001 and 2008. By 2013, Microsoft had decided to exit this aspect of the ads business, selling the Atlas intellectual property to Facebook.

E. Documents from Google's Clients Illustrate the Gross and Significant Data Asymmetry and Demonstrate the Impossibility of a "Learn by Doing" Model

101. The significant data asymmetry and the impossibility of the "learn by doing" model for Google's clients are evident in documents produced by Google where Google employees discuss queries from its customers Criteo, DBM, and Intage.

102. In 2018, the advertising company Criteo contacted Google to try to get information on why there were significant changes in what it was winning on AdX auctions. In internal emails, Google employees note that "Criteo is seeing 2-3% of auctions win below the floor."¹⁴¹ In these emails, Google employees speak about experiments and are uncertain about whether or not certain experiments have been "turned off" and expressing surprise ("news to us") that some experimental programs are running.¹⁴² Google employees are puzzled when they notice that Criteo's spend drops off and then stays down more than 50% year by year. These facts tell us that both Google's internal teams and Criteo could not determine how experiments were affecting their sales.

103. While Google worked with Criteo to understand the experiment-driven changes, Google employees ask internally whether they should offer verbal answers, which suggests that that they are being cautious about how they are responding to Criteo's questions.¹⁴³ The fact that Criteo, a company with extensive analytical resources, could not figure out why they were observing the outcomes they were seeing is a striking example of how even the most resourced of Google's advertisers lack information to ascertain what is happening in their transactions on AdX. The fact that Google could not internally figure out what is happening with its own experiments (e.g., whether they were running or not, why they were having the effect they were having) illustrates a deeper problem.

104. Internally, Google remarks that it did not think that the industry was going in the direction of having first-price auctions. In a bulleted list in one email regarding a client summit agenda, Google Account Executive Megan Hilts writes, "1st price auctions (a long shot that AdX moves to 1st price, but worth the itinerary)."¹⁴⁴

¹⁴¹ GOOG-DOJ-AT-01251555.

¹⁴² *Ibid.* at 556.

¹⁴³ *Ibid.* at 557-58.

¹⁴⁴ *Ibid.* at 557-

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Again, Google employees are often uncertain about the nature of the auction environment. This deepens the informational challenges for Google's customers.

105. Another case one can see a sophisticated company trying to ascertain what was going on in Google's auctions involved DBM Japan ("DBM") and Intage.¹⁴⁵ DBM and Intage were using sophisticated analytics techniques that few advertisers would be able to deploy, and even then, it was difficult to discern what was going on.

106. As DBM and Intage began to send questions to Google, Google employees began to suspect that they were not working in a true second-price auction, and some were alarmed as this possibility became distinct. DBM and Intage expected that they would be in a second-price auction, since this was an industry norm, as the Criteo email chain illustrates. Even this basic rule of the game, however, came into doubt. The following events detail how Google investigated what was happening with DBM.

107. On February 29, 2016, Google employee [REDACTED], Research Manager, Market Insight, Google Japan, wrote an email to Google researcher [REDACTED] with the following subject line: "URGENT : DBM seems based on not second-price but first-price auction."¹⁴⁶ The email goes on to describe what [REDACTED] was:

Our research conducted with Intage has shown a strange result about winning price distribution of AdExchange & DBM.

Here is our research result.

<https://docs.google.com/a/google.com/spreadsheets/d/111AS2Eg8zaOU-gvxmW4BmCmiDpAJ000Lts5oLq2yv4w/edit?usp=sharing>

Not second-price but first-price auction seems to work here. Please look at the differences of winning price distribution of each day and each Max CPM. It seemed automatically optimized to fit with bidding price which advertisers set. It's really bad for advertisers and they never expect such a thing happens in the combination of DBM +AdX.

¹⁴⁵ In my experience, Intage is primarily an analytics firm. On their website, INTAGE Inc. "Strengths of INTAGE." Accessed on September 2, 2024.

<https://www.intage.co.jp/english/feature/?bn=1-202212.>), they list their four "powers" as "360-degree Understanding of Consumers", "Data Activation", "Marketing PDCA Support", and "Connecting Different Industries from a Neutral Position". "PDCA" stands for "plan-do-check-act" and is another version of the marketing funnel. Three of the four "powers" are highly analytical. In the email correspondence, Intage is described as an "advertiser" of DBM, which is certainly possible, though I think it much more likely that Intage and DBM were working together on behalf of other advertisers when they discovered the manipulations of RPO.

¹⁴⁶ GOOG-NE-05308050 at 057,

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Could you reach out to the product team and investigate why it happen as soon as possible? Please let me know if you need more information for the research.

One more thing; We are running the same research with non-AdEx inventories via DBM now. However, it shows normal distributions of winning price and seems to work as we expect. So, this problem only happening DBM & AdX.

Thanks in advance, [REDACTED]

108. Reply emails to this chain repeat the remark that this cannot be a second-price auction:

What happening here is no matter how high CPM you set, DBM buys any impressions with almoat [sic] the price. According to their research, DBM doesn't seem to be 2nd price auction.¹⁴⁷

109. In subsequent emails, Google employees go back and forth, trying to determine whether they are indeed operating in a second-price auction with DBM. On March 1, 2016, Google employee [REDACTED], Manager, Platform Specialists (APAC AdX) writes, "To me, it looks second price is working. If not, bidding price should be equal to winning price."¹⁴⁸

110. [REDACTED] remarks on the odd distribution that they would not expect to see in a first-price auction:

We expected that winning price should follow basically a log-normal distribution. Strictly speaking, it's a mixture distribution of log-normal and round numbers like 150, 100, 500 which many CPM advertisers are likely to set manually. FYI: This (WIP) is our analysis with auction data which we collected in July—September in last year and it looked fine in the period at least.https://docs.google.com/presentation/d/1xvOB-H_g-4ZG-pAPC-KIXgtRSnDzSuTjexIlOuzVIk4/edit#slide=id.g83d3c5667_0_17

However, the winning price distribution has become changed and peaked at the max CPM selected by an advertiser since last October. When they set 1000, 2000, 3000 yen as max CPM, the distributions of winning price of each campaign peaked at the price respectively. If

¹⁴⁷ *Id.*

¹⁴⁸ *Ibid.* at 056.

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second-price auction worked in a right way, we could hardly imagine such a distribution would be shown.¹⁴⁹

He also writes,

In the meantime, you could say something along the lines of "We can confirm that there isn't a first price auction on AdX at this time, and we're doing more investigation into the bid/win histogram you sent. Please ensure that customers aren't bidding higher than they are willing to pay as competition can be quite high for valuable users."

111. On March 3, 2016, Google employee [REDACTED] replied,

Intage is asking us to explain why AdX win prices are very close to their fixed bid prices. I plotted bid price (orange) and win price (blue) below for Intage's 3day campaign. Is there some sell-side feature that can explain the cluster of win prices right below the bid price?¹⁵⁰

112. On March 11, 2016, the matter begins to circulate on Google's Global Analytics team. Analyst [REDACTED] writes,

One of DBM Japan's advertisers, Intage, has noticed that their winning prices are all coming in just under their bid price (which is set at 1000, 2000 and 3000 JPY across three campaigns). The expected win price is somewhere in the order or 300—500 yen, because the bid prices are so high (and they know it).

What's interesting, however, is not the absolute price itself, but rather the behaviour of the win prices. If you look at the chart below, you'll see that most of the time the winning price (blue) comes in at just below the bid price (orange).¹⁵¹

He also writes, in bold,

Has anyone else come across this issue? More specifically, did any of your buyers notice? If so, how did you message this, given it's quite clear in the comms doc that we should not communicate this release externally?

If something else other than RPO is going on, I'd be grateful for some clarification.

¹⁴⁹ *Id.*

¹⁵⁰ *Ibid.* at 053.

¹⁵¹ *Ibid.* at 052.

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113. In replies to this chain, Google employee [REDACTED], Head of Commercialization DoubleClick AdX, Buy-Side, writes,

From what I understand after talking w/ [REDACTED] we don't have any externally shareable RPO comms. Is there anything we can tell DBM here?

DBM's optimization strategy is to create line items with very short user list recency settings 1(minute, 5 minutes, etc) and bid very high for them (\$100+). They do this because their algorithm isn't strong for many performance advertisers. So I think they will run across this more as it's applied to more auctions.

114. Later, [REDACTED] writes,

We're working on messaging about overall auction changes and should have something ready by April. As you know, this is a sensitive subject and consensus must be built before we communicate anything to customers. It' [sic] Please do not forward this thread (analyst/comms only). Circle of trust.

115. Ultimately, what this email chain demonstrates is that,

116. internally, Google was aware that its most sophisticated customers were seeing patterns that suggested that they were running first-price auctions. It is also clear that, internally, Google was both unsure about what its experiments were doing and, at the same time was loath to reveal what it was seeing internally to its customers, asking for communications to remain in the "Circle of Trust."

117. For every company like DBM and Intage, there are hundreds of other companies that were paying more for their ads, and, by extension, their sales, than a second-price auction would normally allow.

118. The auction environment began to shift with the advent of header bidding, which I have detailed in my Opening Report, Google also began to see header bidding as a threat to its auctions.¹⁵² In a November 2016 email chain, [REDACTED] refers to header bidding as an "existential threat."¹⁵³ This statement suggests that Google was aware of the attempts to replace its auction environment. Alongside its reluctance to discern clearly and reveal the problems with its auction, Google retained its position of exploitative power and quashed header bidding.

¹⁵² Opening Report § VI.D.

¹⁵³ GOOG-TEX-00030151.

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VII. Category Three: Unsupported Conclusions Drawn from a Flawed Survey Instrument

119. Dr. Simonson deploys several surveys in the service of his conclusion. My criticism of The Simonson Survey can be divided into two categories: (1) the inappropriateness of the survey instrument to draw the conclusions he seeks to draw and (2) issues with the surveys themselves. I believe that, in the context of this case, any survey instrument that captures the phenomena that Dr. Simonson is attempting to measure, would be Byzantine in its complexity and unreliable. The Simonson Survey does not provide empirical evidence of the phenomenon that he purports to study, i.e., budget allocation decisions by marketers. Given the unreliability of this instrument, the numerous methodological shortcomings are secondary but still fatal to the reliability of Dr. Simonson's analysis. I will elucidate both categories of errors.

A. Dr. Simonson's Flawed Survey is Misleading and Unreliable

120. Dr. Simonson was given an unworkable assignment. Specifically, Dr. Simonson was asked "by counsel for Google, LLC ('Google') to conduct surveys designed to examine how advertisers at companies and advertisers at ad agencies (collectively, 'advertisers') approach, manage, and evaluate digital advertising and, in particular, display advertising and programmatic display advertising."¹⁵⁴ His report does not provide a rationale for his use of a survey, and the Simonson Report immediately launches into the methodological aspects of the survey without discussing how a survey can measure this complex and nuanced topic.

121. Media optimization is a complicated topic and, at large advertisers or agencies, many people, with decades of cumulative experience, work on optimization problems.¹⁵⁵ The Simonson Survey asks a series of simple questions along the lines of the following: "So if the cost of programmatic display advertising increases (while the cost of other advertising types remains the same), will you or won't you divert some of your advertising spending for the coming year to other types of digital advertising?" It is my opinion that this question, without context and posed in nonnumerical fashion, does not correspond to a situation faced by a media optimization team at a large advertiser and certainly does not align with the experience of small advertisers. It is my opinion that the answers to this question do not support the opinions offered in the Simonson Report.

122. An analogy about optimization decisions may be helpful. A consumer who purchases, for instance, eggs, might be asked "if the cost of eggs increased by a small but significant amount, would you divert some of your food budget to other

¹⁵⁴ Simonson Report ¶13.

¹⁵⁵ Einhorn, Terence. "Optimizing Media Spend: Strategies and Insights." Measured, January 30, 2024. Accessed on August 27, 2024. <https://www.measured.com/faq/optimizing-media-spend/>.

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sources of protein?”¹⁵⁶ For a price conscious consumer, a change of \$0.05 could be relevant and cause that consumer to stop buying eggs. Another consumer might consider a doubling of the price “small but significant.” Another may have a young child who only eats eggs and would be unlikely to shift spend at any price range. Household budgets and nutritional demands are nuanced and complex. Managing a marketing budget is similar, but even more challenging.¹⁵⁷

123. Returns on marketing spend are highly variable and difficult to measure.¹⁵⁸ The Simonson Report draws conclusions about a change in display pricing based on small changes to the cost of buy-side tools.¹⁵⁹ Google’s take rate during the

¹⁵⁶ Note one immediate imperfection of this analogy, expand upon below: the changes in price at issue in this case are not changes in the price of the ads (eggs in this analogy). Instead, Google’s take rate is part of the cost of serving ads. I mimic the flawed Simonson Survey by asking about eggs here, but it would be more accurate to ask “If the cost of egg cartons increased by a small but significant amount...”

¹⁵⁷ The media decisions at large companies are complex and the product of lengthy discussions. I have not seen *any* advertisers make decisions in the manner implied by the Simonson Survey. For instance, I have worked with a very large advertiser who was nonplussed by the cost and perceived value of branded search marketing. On their behalf I performed a 12-week experiment estimating the impact of the branded search. My analysis showed that 3% of online sales were attributable to branded search and we estimated the diminishing returns relationship for the channel, slightly increasing spend, contrary to the advertiser’s prior beliefs.

In another example, a mid-sized advertiser was faced with rising CPAs for their display advertising campaign. After extensive, cookie-level analysis, I discovered that the rise in CPA was a function of a small number of cookies consuming a large number of impressions. By implementing a modest frequency cap across a handful of properties, we were able to lower the CPA for display into a range that was competitive with other channels.

Both cases involve hypotheses about increases in costs for a channel and advertisers who chose a learn-then-act approach to the problem. Rarely in my career have I seen advertisers make drastic channel-allocation decisions based on changes to costs in a channel, much less changes in cost to a technology required to operate in a channel. (The Simonson Survey incorrectly asks about the former, though the latter is at issue in the case.)

¹⁵⁸ Lewis, Randall & Rao, Justin, *The Quarterly Journal of Economics*, Volume 130, Issue 4, November 2015, accessible at <https://academic.oup.com/qje/article-abstract/130/4/1941/1914592> (accessed on September 6, 2024) (“Twenty-five large field experiments with major U.S. retailers and brokerages, most reaching millions of customers and collectively representing \$2.8 million in digital advertising expenditure, reveal that measuring the returns to advertising is difficult.”).

¹⁵⁹ Simonson Report ¶ 18 (“Advertisers and ad agency employees can and do adjust their advertising spending allocation based on information on costs and returns of various advertising types. In response to a scenario involving a “small but significant” increase in the cost of programmatic display advertising (or display advertising more broadly, in the case of lower-spend advertisers), approximately 54 to 61 percent of advertisers and ad agency employees indicated that they would divert spending to other types of digital advertising (described below). These results were generally consistent for higher-spend advertisers, lower-spend advertisers, and ad agency employees,

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time at issue was typically around [REDACTED].¹⁶⁰ A 5% increase in take rate would result in a new take rate of [REDACTED]. A 10% increase results in a take rate of [REDACTED] of the transaction cost. Given the complexity of marketing measurement and the small¹⁶¹ effective change in price, it is my opinion that marketers would be unlikely to shift spend based on this sort of price change. It is also my opinion that most survey respondents were not thinking of these types of increases when prompted with “small but significant” in the Simonson Survey. I find the Simonson Report’s explanation of the use of this language unpersuasive.¹⁶²

124. It is not practical to use a survey to estimate optimization decisions by marketers. To do so would require questions based on scenarios that marketers regularly face, including the advertiser, their marketing strategy, the available creative for that advertiser, the lead time needed to create additional creative, the history of that advertiser’s experience in the marketing channels under discussion, the exact changes in costs associated with display, the resulting impact (if any) on the ROI associated with that channel, the internal politics related to changing spend across channels (for large advertisers and agencies), and the particular expertise of the person doing the media optimization. If a question as simple as Dr. Simonson’s could reasonably assess the reaction to a price change in a specific channel, then it would be trivial and inefficient to write algorithms to perform these optimizations, which it is not. Instead, it is people, who are actively synthesizing these variables and balancing difficult-to-quantify aspects of marketing, who are responsible for the job of optimization.

125. The limits of surveys are well known and well established.¹⁶³ In particular, the gap between respondents’ intentions and behaviors has a rich record in academic literature.¹⁶⁴ Surveys can only give us insight into respondents’

suggesting that advertisers of all types would react to changes in the cost of programmatic display advertising by reallocating spending to other advertising types.”).

¹⁶⁰ Opening Report ¶ 353.

¹⁶¹ “Small” in terms of metrics such as CPA for an individual transaction, not small in aggregate across trillions of auctions.

¹⁶² Simonson Report ¶ 65.

¹⁶³ Pilcher, N., and Cortazzi, M. “Qualitative’ and ‘quantitative’ methods and approaches across subject fields: implications for research values, assumptions, and practices.” *Quality & Quantity* vol. 58, pp. 2357–2387. 2024. <https://doi.org/10.1007/s11135-023-01734>; and Agius, S.J., Qualitative research: its value and applicability. *The Psychiatrist*. 2013;37(6):204-206. <https://doi.org/10.1192/pb.bp.113.042770>.

¹⁶⁴ Sheeran, P., Intention–Behavior Relations: A Conceptual and Empirical Review. *European Review of Social Psychology*, 12, 1-36. 2002. https://www.researchgate.net/profile/Paschal-Sheeran/publication/279613604_Intention-

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intentions, not their actual behaviors. A survey deployed in 2023 has temporal restrictions as well, potentially giving insight into 2022 behavior, but providing little information about behaviors a decade earlier.¹⁶⁵ In the case of the Simonson Survey, the connection between the scenarios he lays out and the reality of marketing observation is attenuated to the point of being nonexistent. Additionally, “[q]ualitative methods are designed to reveal what is going on by describing and interpreting phenomena; they do not attempt to measure how often an event or association occurs.”¹⁶⁶

B. The Simonson Survey has Critical Methodological Flaws

126. The methodology of the Simonson Survey is rife with significant issues undermining the representation and accuracy of his findings. The approach to pre-screening excluded a meaningful segment of the relevant advertising community due to overly restrictive criteria based on job responsibilities and company types. Such exclusions risk skewing the data by failing to capture the full spectrum of industry practices and opinions, which are crucial for a comprehensive analysis of the digital advertising landscape.

127. The construction and phrasing of the survey questions raise substantial issues regarding their clarity and the potential for eliciting biased responses. Ambiguities in key questions, especially those that require respondents to consider hypothetical scenarios, lead to speculative answers that do not reliably reflect actual

Behavior_Relations_A_Conceptual_and_Empirical_Review/links/602acf014585158939a938d5/Intention-Behavior-Relations-A-Conceptual-and-Empirical-Review.pdf.

¹⁶⁵ Smith, J.P., and Thomas, D. “Remembrances of Things Past: Test–Retest Reliability of Retrospective Migration Histories.” *Journal of the Royal Statistical Society Series A: Statistics in Society* vol. 166, no. 1, pp. 23–49. February 2003. <https://doi.org/10.1111/1467-985X.00257> (“The literature indicates that a question about an event that occurred decades ago tends to yield a less reliable response than a query about a similar event which took place last week or last year.”); and, Müggenburg, H. “Beyond the Limits of Memory? The Reliability of Retrospective Data in Travel Research.” *Transportation Research Part A: Policy and Practice* vol. 145, pp. 302–318. March 2021 (“When evaluating retrospective data according to the quality criteria of quantitative research (Moosbrugger & Kelava, 2007), the criterion of reliability is most notable: recalling detailed information of past years later seems rather difficult. Besides the ability to remember, another important aspect is accuracy: do respondents remember the past correctly? Did the event in question really happen at the indicated point in time or a few months or years earlier or later? Would the respondent give the same answer if he or she were asked a second time? Large samples may correct unsystematic errors, but systematic distortions limit data quality immensely. Regarding economic aspects, the literature discusses the higher motivation needed due to the higher burden on cognitive resources while answering a complex survey. This in turn may also have negative effects on data accuracy.”).

¹⁶⁶ Agius, S.J., Qualitative research: its value and applicability. *The Psychiatrist*. 2013;37(6):204-206. <https://doi.org/10.1192/pb.bp.113.042770>.

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or future behaviors.¹⁶⁷ The wording of these questions is critical, as confusing or leading questions can significantly influence the responses, potentially resulting in data that misrepresents real-world practices.

128. The data's empirical reliability is compromised further by indications that respondents may not have engaged deeply with the survey content. Rapid completion times and patterns in the responses suggest a lack of attentiveness, which can introduce substantial noise into the findings. Without ensuring that participants fully understand and consider each question, the integrity of the data collected is under question, rendering any conclusions drawn from such data as tentative at best.

129. In terms of analytical interpretations, the report overstates the fluidity with which advertisers switch between different digital channels. Such claims require cautious scrutiny, as they hinge heavily on the assumption that the survey responses accurately and comprehensively represent the advertisers' decision-making processes. Without a robust foundation in reliable and valid data, conclusions about substitutability and the strategic use of advertising channels could mislead stakeholders about the dynamics of the digital advertising market.

130. In essence, while the survey aims to shed light on complex phenomena within digital advertising, methodological flaws—from sample selection to question design and data analysis—suggest that the results may not provide a reliable basis for understanding advertisers' behaviors or for informing industry practices. A more inclusive approach to participant selection, alongside rigorously tested survey instruments, would be essential to improve the validity of future research in this area.

1. Issues with Pre-Screening and Screener Questions

131. A foundational concern with survey design is determining the population about which inference is needed and designing a sample frame and sampling methodology that allows for a representative sample from this population.¹⁶⁸ The Simonson Survey failed to correctly identify the target population for his survey and failed to survey it in the correct manner.

¹⁶⁷ For instance, the Simonson Survey asks questions squarely in the world of hypotheticals. The key diversion question, "So if the cost of programmatic display advertising increases (while the cost of other advertising types remains the same), will you or won't you divert some of your advertising spending for the coming year to other types of digital advertising?", does not give the respondent a foothold to answer the question in a realistic way. Does display increase from, say, a \$5 CPA to \$10? To \$5.25? The Simonson Survey is asking a question with no analog in reality for the respondent.

¹⁶⁸ Seidman Diamond, Shari, Reference Guide on Survey Research, *Reference Manual on Scientific Evidence*, 3rd ed. (2011), 359–423, at 376–77. <https://poplab.stanford.edu/pdfs/Goodstein-HowScienceWorks-Ch3NRCmanual2011.pdf>.

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132. The pre-screening criteria applied in the survey may have inadvertently excluded a significant portion of the industry's stakeholders. Question QS6 asks respondents to identify their job responsibilities and terminates the survey if "Advertising or Marketing" is not selected.¹⁶⁹

QS6. Which of the following do you have any involvement in as part of your job responsibilities? (*Please select all that apply.*)

- ☐ Hiring/HR
- ☐ IT/Tech
- ☐ Business intelligence/Data science
- ☐ Sales or account management
- ☐ Accounting/Finance
- ☐ Advertising or Marketing
- ☐ Website/Mobile App design/development
- ☐ Customer relationship management
- ☐ Data analysis/statistics

133. I have made optimization decisions on hundreds of marketing campaigns. If faced with QS6, I, along with my clients, would likely have selected "Data analysis/Statistics" and "Business Intelligence/Data Science."^{170 171} Selecting these two options would have made me ineligible for the survey. This type of screening limitation could skew the results, leading to conclusions that do not fully reflect the realities of digital advertising across different sectors and scales of operation.

134. The complexity and lack of clarity in the screener questions themselves contribute to further biases in participant selection. If the questions were not clear or were too narrowly defined, relevant respondents might have been excluded based on misunderstandings or overly stringent qualifications. Such exclusions are particularly problematic in an industry characterized by rapid evolution and a wide range of practices influenced by varying organizational roles and goals. The survey switches focus between the individual respondent, the business unit for which the

¹⁶⁹ Simonson Report ¶ 48.

¹⁷⁰ This pair of categories highlights the arbitrary and confusing nature of Dr. Simonson's screening questions. It would be a challenge for any non-specialist to differentiate between these groups and those that could be confused by the pairings, as am I.

¹⁷¹ The alternative to my selection of my primary category would have been to select every category. It is difficult to work in a large company and not have "any involvement" with Hiring, IT, Sales, Accounting, Website Design, and Customer Relationship Management.

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respondent works, and the company containing that business unit. I can speak from professional experience that the practices that the Simonson Survey is attempting to address can vary widely across those entities. A survey that confuses respondents about the unit of analysis is unlikely to yield clear insights, as this survey fails to do.

135. In addition to excluding respondents that should not have been excluded, Dr. Simonson allows respondents who do not have jobs that would allow them to provide useful insights to answer the questions that Dr. Simonson poses to address his assignment. For instance, the higher-spend advertiser survey, evenly split between companies spending \$500,000 to \$15 million on advertising and those spending more than \$15 million,¹⁷² has many respondents who are executives. At these companies with large advertising budgets, 24% (118 out of 502) of respondents indicated their job title was “C-Level (CEO, COO, CMO, etc.).”¹⁷³ It is my opinion that it is implausible that Advertiser Perceptions, the company that Dr. Simonson used to recruit his sample, recruited this fraction of executives¹⁷⁴ at such large companies.¹⁷⁵

136. And if Advertiser Perceptions was actually able to recruit such an executive-heavy sample from such large companies, the problems multiply.¹⁷⁶ Executives at companies with advertising budgets, and attendant revenues,¹⁷⁷ of this size do not engage in regular optimization decisions of the type the survey is designed to evaluate. I have worked with dozens of Chief Marketing Officers (“CMOs”) while at Microsoft and as a consultant. In my experience, CMOs weigh in on optimization decisions at the annual level and, occasionally, quarterly. The questions in this survey, regarding how budgets would shift based on small changes to, in essence, technology fees, would be well below the CMO-level, to say nothing of other C-Level roles.

137. The Simonson Survey excludes numerous firms who represent large fractions of spend on Google and whose optimization behaviors are germane to this case. Dr. Simonson directed the survey administrators to pre-screen respondents to

¹⁷² Simonson Report ¶ 84.

¹⁷³ Simonson Report ¶ 84.

¹⁷⁴ For companies of this size, non-CEO executives would typically receive total compensation (salary, bonus, and stock) between \$250,000 and \$1.5 million per year. At the midpoint of this range, a 10-minute survey would represent a \$75 opportunity cost.

¹⁷⁵ Simonson Report ¶ 30.

¹⁷⁶ And, if these survey respondents were misrepresenting their roles, the survey becomes even more unreliable.

¹⁷⁷ Typically marketing budgets are 5-10% of company revenue. A company spending \$15 million on marketing would then be expected to have annual revenues between \$150 million and \$300 million. Many respondents may have been from companies with revenues exceeding \$1 billion.

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exclude those associated with companies involved in ongoing litigation related to the survey's subject matter. This pre-screening led to the exclusion of 580 companies, including several of the largest by revenue and advertising spend, i.e., key players in the market.

138. The exclusion of such substantial market participants brings into question whether the Simonson's survey sample is representative. The survey, by excluding top advertisers, especially those known for their substantial digital advertising expenditures across various sectors, likely distorts its findings. This is because these companies' advertising strategies and expenditures could significantly influence industry trends and standards, which are not adequately represented in Simonson's sample.

139. Furthermore, the absence of large global ad agencies, referred to as the "Big Six,"¹⁷⁸ from the Simonson Survey sample further undermines its representativeness. These agencies handle a significant portion of advertising spending and are instrumental in shaping advertising practices and preferences. Their exclusion means that the survey does not fully capture the prevalent practices in the industry.

140. Thus, while the survey aims to provide insights into the U.S. advertising landscape, the exclusions applied in the sampling process suggest that the findings may not comprehensively reflect the actual practices and trends of the broader market. This oversight in sampling limits the applicability and accuracy of the conclusions drawn from the survey data.

2. Issues with the Survey Instrument Itself

141. One of the central flaws in the Simonson Survey design is found in his question on "diversion," which asks respondents how they would react if the cost of display advertising were to increase by a "small but significant amount." The issue here is multifaceted, beginning with the vagueness of the term "small but significant." Without a clear, quantifiable definition, respondents are left to interpret this phrase based on their own understanding, which is likely to vary significantly.¹⁷⁹ This variation introduces a level of subjectivity that can lead to inconsistent responses across the survey population, undermining the reliability of the data collected. For instance, in some industries, a marketing cost change of 2-3% could be seen as

¹⁷⁸ The "Big Six" agency holding companies are WPP, Publicis Groupe, Omnicom, Interpublic, Dentsu, and Havas. Digiday. "What Holding Companies' 2023 Earnings So Far Tell Us About Their Future." Accessed on August 27, 2024. <https://digiday.com/media-buying/media-buying-briefing-what-holding-companies-2023-earnings-so-far-tell-us-about-their-future/>.

¹⁷⁹ As it were.

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significant, whereas for others a change of 20-30% might be significant.¹⁸⁰ When survey questions allow for such wide-ranging interpretation, the results become less about measuring actual behavior or intention and more about capturing individual perceptions, which can distort the overall findings.¹⁸¹

142. Moreover, the use of loaded language, such as “significant,” can inadvertently lead to what is known as a “demand effect,”¹⁸² where respondents provide answers they believe are expected or desired by the surveyor rather than their true opinions. This type of bias is particularly problematic in a legal context, where the objective is to gather unbiased, factual information. By framing the question in a way that focuses respondents solely on cost—without considering other factors that typically influence advertising decisions, such as target audience reach, campaign objectives, or brand alignment—the question steers respondents toward a particular type of answer. This not only limits the scope of their responses but also creates an artificial scenario that doesn’t accurately reflect the complexity of real-world decision-making processes.

143. The survey’s failure to account for the varying contexts in which respondents operate further exacerbates the issue. For example, what might be considered a “significant” cost increase for a small business could be negligible for a large corporation with a substantial advertising budget. By not segmenting responses based on factors like company size, industry, or advertising spend, the survey conflates the experiences and perspectives of diverse respondents, making it difficult to draw meaningful conclusions. The result is a set of data that, while seemingly

¹⁸⁰ Two brief examples illustrate the point. Working with a massive online retailer, CPA in the appliances category increased by roughly a 3%. For the team managing this channel, the change in performance necessitated a series of meetings and analysis and a full exegesis of the cause.

In contrast, a company in its third year had revenues in the tens of millions of dollars per year. This advertiser regularly saw fluctuations of 10-20% in channel CPA and did not feel those swings demanded immediate management. This company was focused on overall corporate revenue, growing at double-digit percentages year-over-year, and did not feel they had sufficient data to make “rash” optimization decisions.

¹⁸¹ It would be a mistake to read advertiser potential sensitivity to 2-3% change in *CPA* as potential sensitivity to a similar-sized change in *ad buying tools take rate*. [REDACTED]

¹⁸² Alan G. Sawyer, “Demand Artifacts in Laboratory Experiments in Consumer Research,” *Journal of Consumer Research* 1, no. 4 (1975): 20. See also, Itamar Simonson and Ran Kivetz, “Demand Effects in Likelihood of Confusion Surveys: The Importance of Marketplace Conditions,” in *Trademark and Deceptive Advertising Surveys: Law, Science, and Design*, (Chicago: American Bar Association, 2012), 243–259.

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comprehensive, lacks the specificity and nuance needed to inform the legal issues at hand.

144. Dr. Simonson wishes to estimate the impact of a change in the cost of a display ad tool. Advertisers would typically replace an expensive tool with a less expensive tool that could theoretically do the job.¹⁸³ The survey forestalls this option, by requiring respondents to either not react to a “significant” cost change or to divert their spend to a different channel. It is my opinion that this false dichotomy biases the survey results toward diversion.

145. In addition to the flawed questions at the heart of the survey, many survey questions fail to provide respondents with clear and specific guidance, leading to a high probability of guesswork rather than informed answers.¹⁸⁴ For instance, questions that ask respondents to predict future behavior or make choices in hypothetical scenarios, often do so without providing enough context or detail. It is my opinion that this lack of clarity forces respondents to fill in the gaps with their assumptions, which introduces a high level of uncertainty and variability into the data.

146. One of the primary flaws in these questions is their tendency to be overly broad, leaving respondents unsure of how to interpret them.¹⁸⁵ When questions are vague, respondents may struggle to determine what exactly is being asked, leading to a wide range of interpretations. This variability can result in data that appears inconsistent or contradictory, as respondents may base their answers on different assumptions or interpretations of the question. For example, asking respondents to choose between various advertising strategies without clearly defining the parameters of each option can lead to confusion and unreliable data, as respondents might have different understandings of what each strategy entails.

¹⁸³ Firms purchase tools to solve business problems. If a tool increased in cost, the firm would typically seek a lower-cost alternative, rather than modifying their business to no longer have the problem.

¹⁸⁴ Consider question Q6: “To which other types of digital advertising below, if any, would you

divert your advertising spending for the coming year as a result of the **increase in the cost of programmatic display advertising**?” (Bold and underline in the original.) As I describe in the next section, most respondents were answering this question in a matter of seconds. Respondents were allowed to choose among marketing channels that they did not actively use, requiring them to answer the question without the proper context of the costs associated with the channels.

¹⁸⁵ Q6 serves as one example here—the question asks for respondents to make technical business decisions based on unspecified changes to costs. And in a matter of seconds for most respondents.

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147. The speculative nature of some questions¹⁸⁶ can exacerbate this issue. When respondents are asked to make predictions about how they might behave in the future, particularly in response to hypothetical scenarios, their answers are inherently uncertain. People’s predictions about their future behavior are often influenced by a variety of factors that cannot be accounted for in a survey, such as changes in market conditions, shifts in company strategy, or unforeseen external events. As a result, the data collected from these speculative questions are not only unreliable but, it is my opinion, misleading if taken at face value. In my opinion, the speculative nature of these questions is misleading, encouraging respondents to give answers more reflective of current perceptions or desires rather than concrete plans or actions, which diminishes the utility of the data for making informed conclusions.

3. Issues with Survey Analysis

148. The survey data reveals significant issues that undermine the survey’s reliability and the conclusions drawn from it. A notable concern is the apparent lack of respondent engagement, as evidenced by the use of decoy answers designed to assess attentiveness. The fact that many respondents selected these decoys suggests that they were not fully engaged or careful in their responses.¹⁸⁷ Additionally, a substantial fraction of the participants—25%—completed the survey in under six and a half minutes,¹⁸⁸ which translates to less than ten seconds per survey screen. Given the complexity and importance of the questions, this rapid pace indicates that these respondents likely did not consider their answers. It is my opinion that this lack of engagement casts serious doubt on the validity of the survey results.

149. There is a troubling discrepancy between the data and its interpretation concerning display advertising. While the survey data clearly shows that display advertising constitutes the largest portion of the respondents’ digital ad spending, the survey incorrectly characterized it as a “relatively small” part of their budget. This misrepresentation distorts the actual behavior and priorities of advertisers, leading to misleading conclusions about how resources are allocated in digital advertising. The importance of display advertising is significantly downplayed, which misinforms about the true dynamics at play.

150. Additionally, there is a fundamental misunderstanding regarding the costs being examined. The focus should be on the specific costs associated with advertising tools, such as ad buying platforms or exchanges, rather than the overall cost of advertising. This distinction is critical because the competitive dynamics in digital advertising hinge not on the total cost of advertising, but on the expenses

¹⁸⁶ For instance, the “small but significant” question discussed above.

¹⁸⁷ See, Simonson Report, Exhibit 1; Exhibit 37; Exhibit 68.

¹⁸⁸ 2024-07-31-Analysis_Group-Simonson/Simonson Data and Analysis/Stata/input/

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related to the tools used to manage and purchase ads. By conflating these two aspects, the analysis fails to capture the true nature of the cost-related decisions that advertisers face. It is my opinion that this oversight diminishes the relevance of the findings and their applicability to the issues under consideration.

151. Finally, the Simonson Report does not produce confidence intervals for his analysis. This is surprising, since he is familiar with the techniques of estimating standard errors for his survey-derived insights.¹⁸⁹ The Simonson Report includes only point estimates for his survey analysis. The report fails to account for the many types of uncertainty present in survey research.¹⁹⁰

VIII. Category Four: Incorrect Assumptions of Homogeneity Among Advertisers and Publishers

152. Many of Google's expert reports portray advertisers and publishers as singular, homogeneous groups, and fail to acknowledge the extensive heterogeneity of advertisers and publishers. This is true not only in scale, but also over time. In the latter regard, digital marketing has evolved significantly over the past fifteen years. It is my opinion that it would be a mistake to equate behavior of one advertiser with another, and to treat behavior of any advertiser or publisher as common practice for the past decade. Google's experts generally draw their reasoning on the potential capabilities of the largest, most resourced, and most sophisticated advertisers and publishers, ignoring the experiences and circumstances of most advertisers and publishers.

153. While the Category Three Error obviates the need to belabor the survey's methodological flaws, the Simonson Report makes errors in Category Four. By using a survey that is largely similar for advertisers of different sizes and agencies, the report fails to appreciate the heterogeneity of these audiences, masking the effect it attempts to estimate.

¹⁸⁹ Two examples from Dr. Simonson's top 20 most-cited works on Google Scholar: Fisman, R., Iyengar, S.S., Kamenica, E., and Simonson, I. "Gender differences in mate selection: Evidence from a speed dating experiment." *The Quarterly Journal of Economics* vol. 121, no. 2, 673-697 at 682. 2006. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=e4ef63ad401362041ebd3b189e7cacadbf666fd81>; Simonson, I., and Staw, B.M. "Deescalation strategies: A comparison of techniques for reducing commitment to losing courses of action." *Journal of Applied Psychology* vol. 77, no. 4, 419-426 at 423. 1992. <https://academic.oup.com/book/10766/chapter-abstract/158883527?redirectedFrom=fulltext&login=false>.

¹⁹⁰ Lyons, P., and Doueck, H.J. "Chapter 5: Sampling and Measurement." In *The Dissertation: From Beginning to End*, edited by P. Lyons and H.J. Doueck, Oxford University Press, 2009. <https://doi.org/10.1093/acprof:oso/9780195373912.003.0005>.

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A. Category Four Error Related to Incorrect Assumptions of Advertiser Homogeneity

154. The Milgrom and Baye Reports both reason about advertisers from a perspective that ignores the limitations that advertisers face when making bidding decisions.¹⁹¹ The Milgrom Report presumes that advertisers have a great deal of knowledge about auctions and bidding strategies that they do not in fact possess.¹⁹² The ease with which advertisers can apply this knowledge, which the Milgrom Report presumes, is illusory, even for the largest, most powerful agencies.¹⁹³ For instance, produced documents capture the discovery of RPO by Criteo,¹⁹⁴ a sophisticated player in the space, but Criteo is the exception in the production, not the rule.

155. The Ghose Report reaches for support of his claim that advertisers reallocate spending between a range of devices and formats. The report reviews Google's Campaign Manager data produced in this litigation (Figure C-1 to C-3 Data) and this is cited as the source of data for figures C-1 to C-3 in Appendix C of his report.¹⁹⁵ The report's stated purpose for this analysis is to examine heterogeneity in budget allocation to support a larger claim, stated above.

156. Marketing budgets are central to what the Ghose Report is trying to review in the analysis, however spend by media type information is not included in Figure C-1 to C-3 Data.¹⁹⁶ The Ghose Report uses impressions as a metric for

¹⁹¹ Milgrom Report §§ III.C.2-3; and Baye Report § V.

¹⁹² Milgrom Report ¶ 32a. ("Advertisers leverage key performance indicators to guide their campaign strategies on buy-side tools and bid effectively. Rather than calculating bids themselves, advertisers delegate many of the details of bid optimization to specialized buy-side tools or agencies, while optimizing their campaign parameters to achieve higher click-through rates, conversion rates, or return on ad spend.").

¹⁹³ See GOOG-NE-05308050.

¹⁹⁴ GOOG-NE-05308050 (Internal Google email re: "URGENT: DBM seems based on not second-price but first-price auction," February 2016. "What we think is happening here is an outcome of the RPO release (Reserve Price Optimisation) on the sell-side, which was launched last year to little or no fanfare, in which reserve prices were dynamically set based on expected bidding behaviour. Kind of like OPA, good for pubs but not necessarily good for buyers. Has anyone else come across this issue? More specifically, did any of your buyers notice? If so, how did you message this, given it's quite clear in the comms doc that we should not communicate this release externally?" Also, "Criteo apparently found something similar and reached out.")

¹⁹⁵ Ghose Report ¶ 126.

¹⁹⁶ GOOG_AT_DOJ_DATA_000247044(Google Campaign Manager data that contains 39,186,451 observations and 28 total variables including date, account name, account id, advertiser name, advertiser id, campaign id, placement id, buying tool, exchange id, user country, media type, environment type, site id, floodlight id, site name, vertical, campaign name, placement name, cost type, publisher, impressions, clicks, video completions, and an FAA advertiser flag. There are 98

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advertisers determining budget allocation stating, “Instead, I tracked impressions, as these are key performance indicators for advertisers determining budget allocation.”¹⁹⁷ The Ghose Report, which acknowledges that different advertising channels have different prices,¹⁹⁸ uses impressions instead of spend in this analysis. The purpose of the analysis is to examine how advertisers make optimization decisions. Optimization decisions are decisions about budget allocation, not impression levels, which are changed based on the budget. Spend and impressions do not have a perfectly linear relationship,¹⁹⁹ and using one as an indicator for the other will not provide accurate results. Putting this aside, I will follow his line of analysis to review the Figure C-1 to C-3 Data.

157. The Ghose Report highlights three specific advertisers in his report who do show variability in impressions in this 24-month period the data covers (August 2021 to June 2023). Explicitly that the Ghose Report purports to show that advertisers can reallocate spend quickly, yet the x-axis for his charts is on a quarterly time scale. I likened budget reallocations to turning an oil tanker. I offer the Ghose Report’s use of quarterly time scales as implicit endorsement of my view. These advertisers are not representative of the data set. The change in impressions by media type and quarter for all U.S. advertisers in the data in the following graph.

distinct publishers including Yahoo, Microsoft, Amazon, and YouTube. Notably, “Google” does not appear in the list of included publishers.)

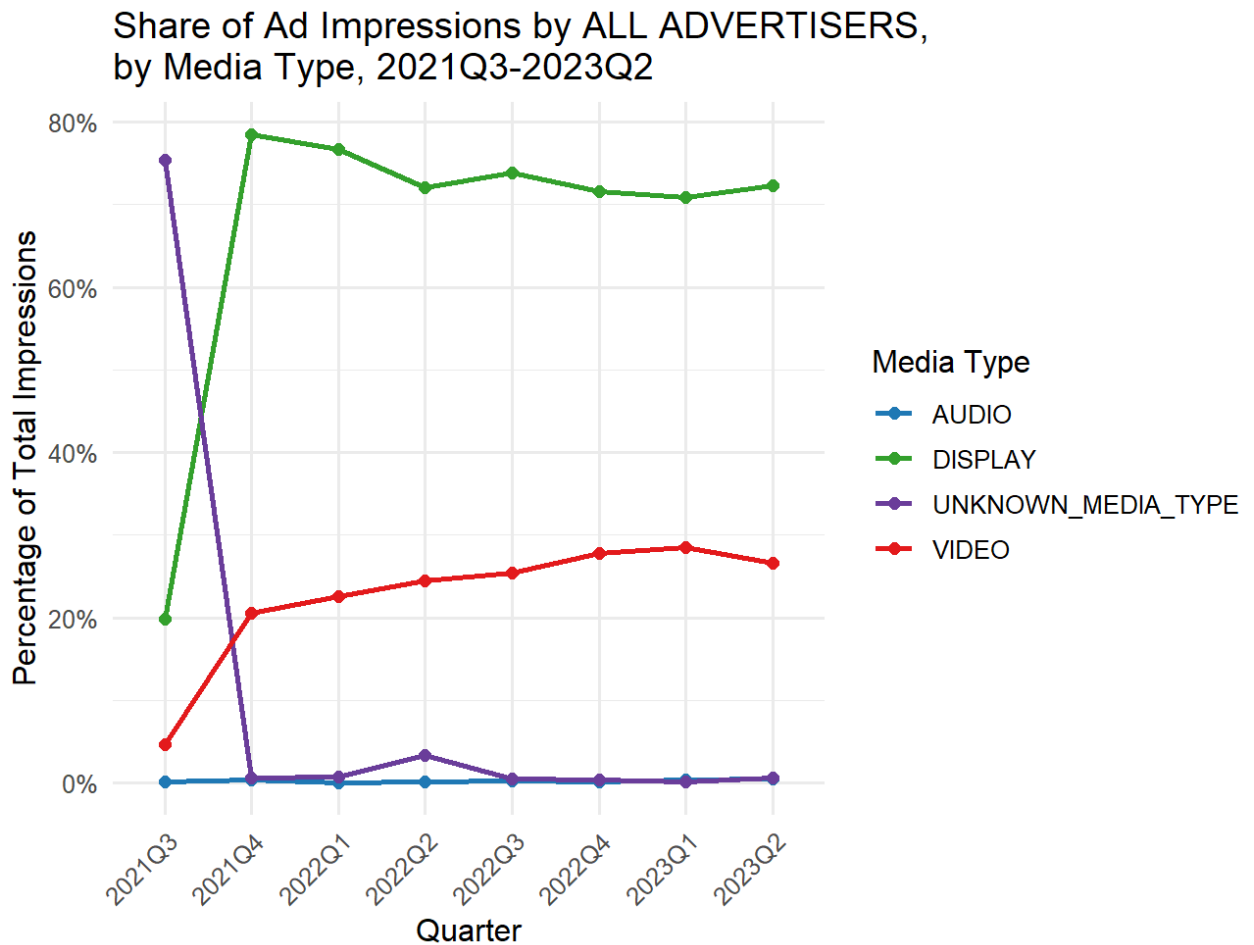
¹⁹⁷ Ghose Report ¶ 127.

¹⁹⁸ Ghose Report ¶ 30.

¹⁹⁹ The cost per impression can vary widely as described in my opening report §V.E. Additionally, the profusion of cost methods (CPA, CPC, CPA, etc.) further obscure the relationship.

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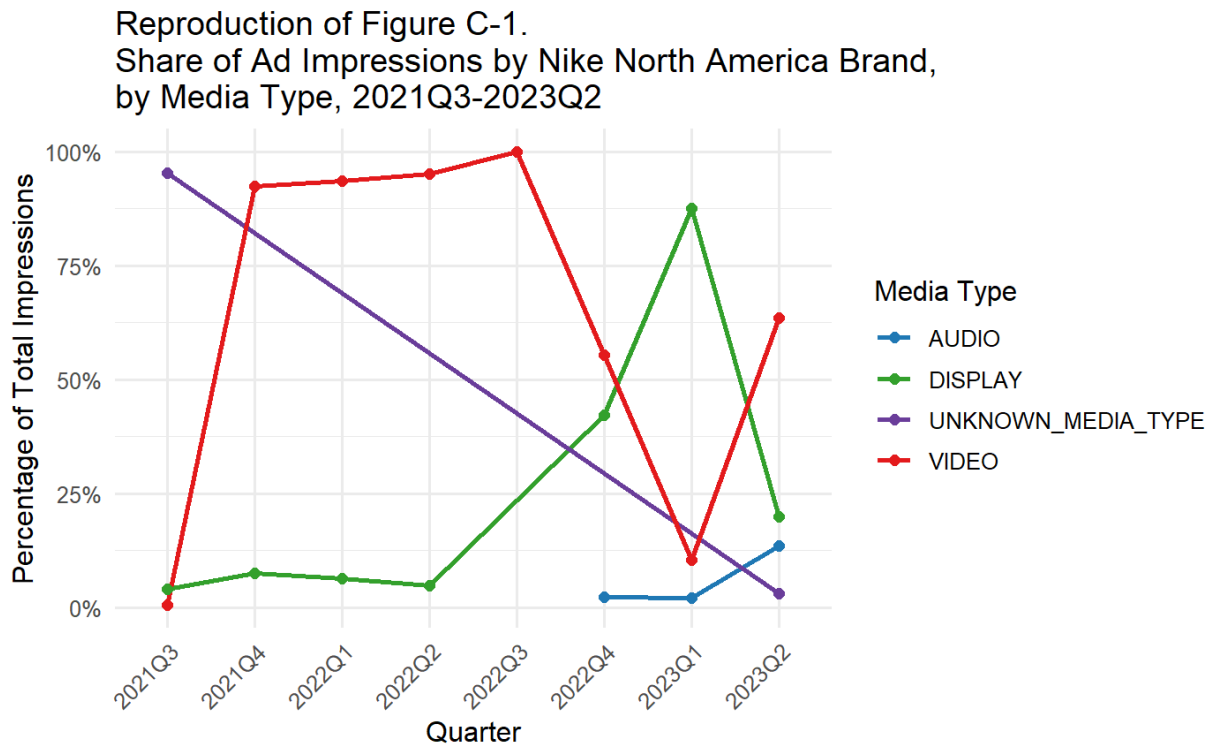
158.



159. There is a high percentage of ‘unknown’ media type impressions recorded in 2021 Q3. By 2021 Q4, it appears most of the ‘unknown’ media type impressions were replaced mostly by ‘display’ impressions and by ‘video’ impressions. Except for the first quarter, ‘display’ impressions are the most prevalent impressions in the data set and maintain an extremely steady volume between 70% and 80% of total impressions by quarter.

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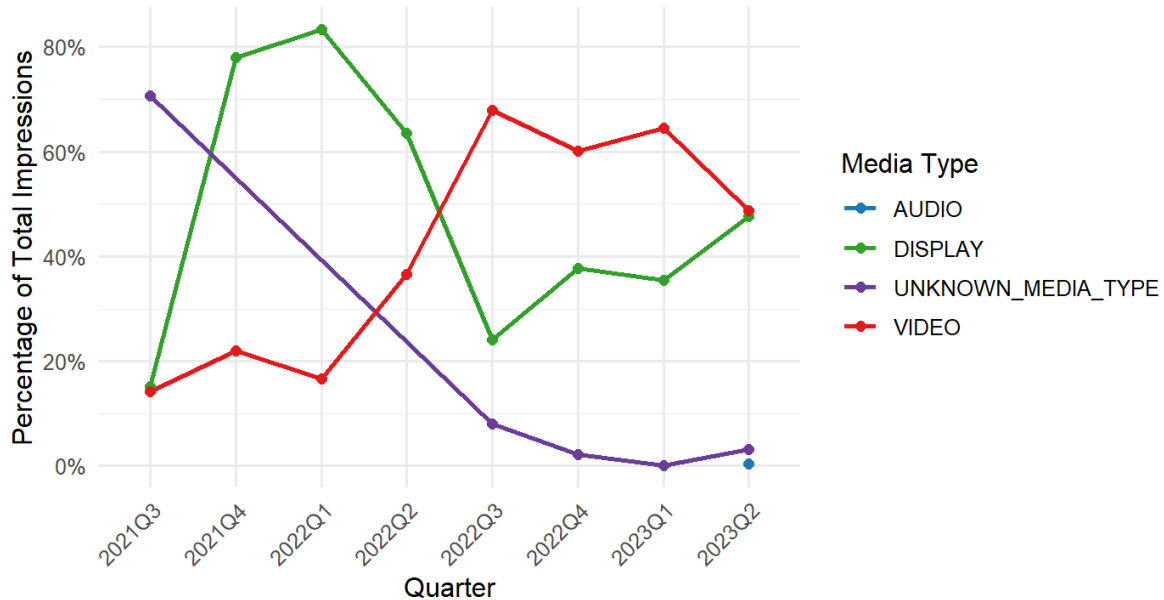
160. Thus, in my opinion, the way the Ghose Report displays the data is misleading. The report notes that he excludes the 'unknown' media type in his graphs, but includes this media type in his calculations, using it as part of the denominator in his percentages. By excluding the 'unknown' media type in his graph, the Ghose Report is not telling the whole story with these visualizations. The report's graphs are recreated here and include the 'unknown' media type in the calculations and the visualization. In each of the following three graphs, which are the ones displayed in the Ghose Report, the 'unknown' media type contributes to the heterogeneity of impressions.



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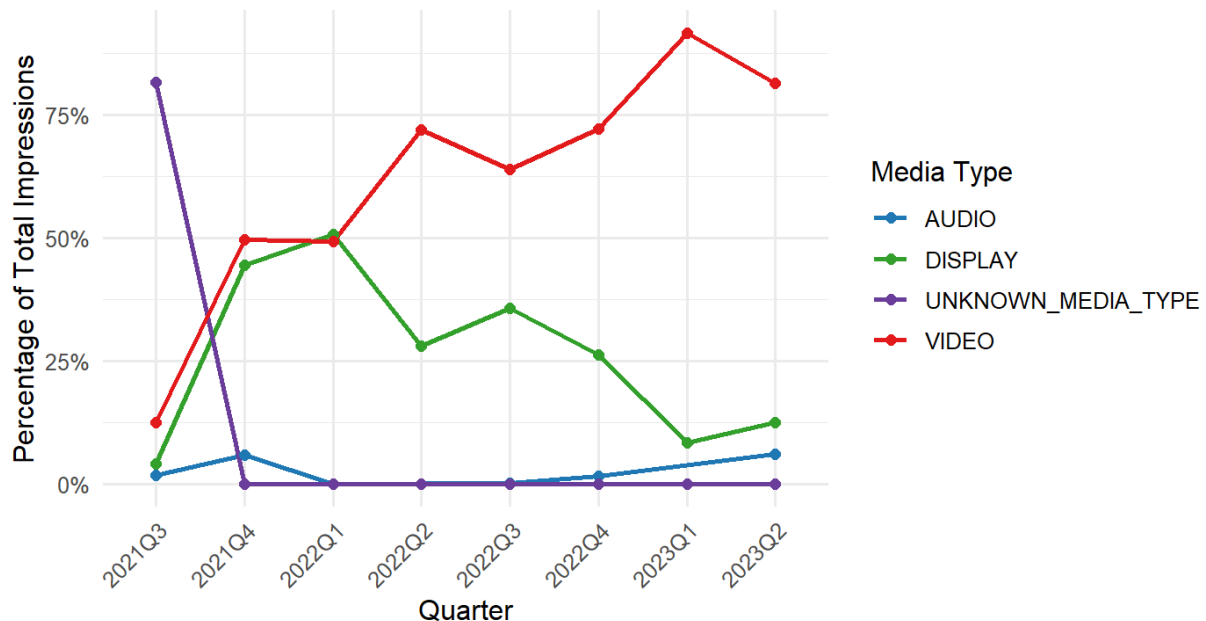
161.

Reproduction of Figure C-2.

Share of Ad Impressions by Macy's Media Network (MMN),
by Media Type, 2021Q3-2023Q2

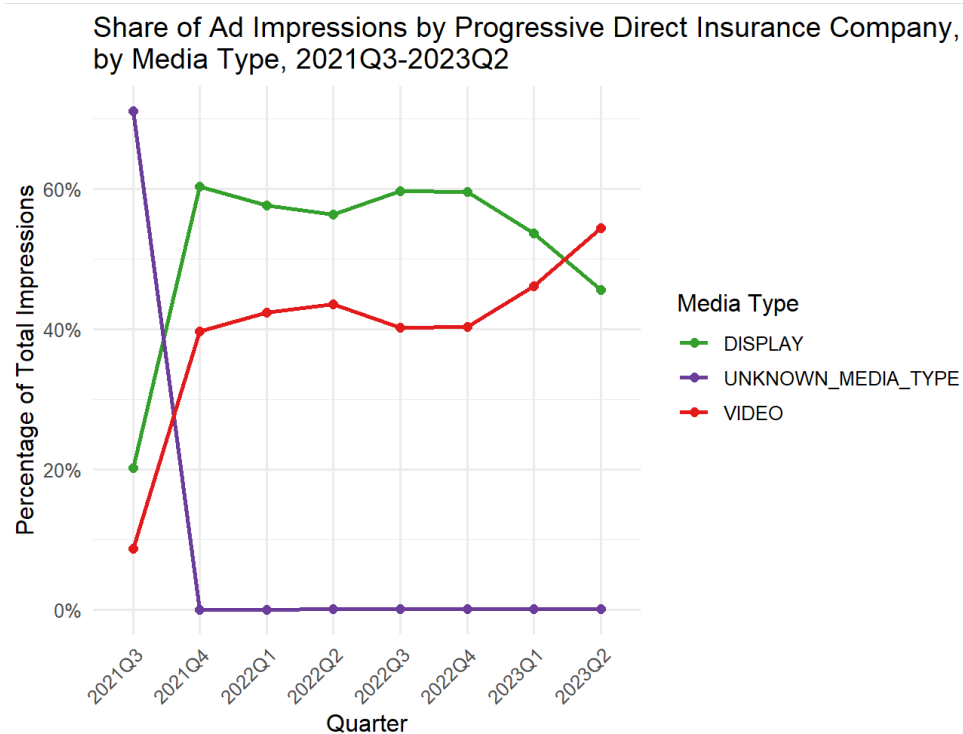
162.

Reproduction of Figure C-3.

Share of Ad Impressions by American Express – Global Advertising,
by Media Type, /n2021Q3-2023Q2

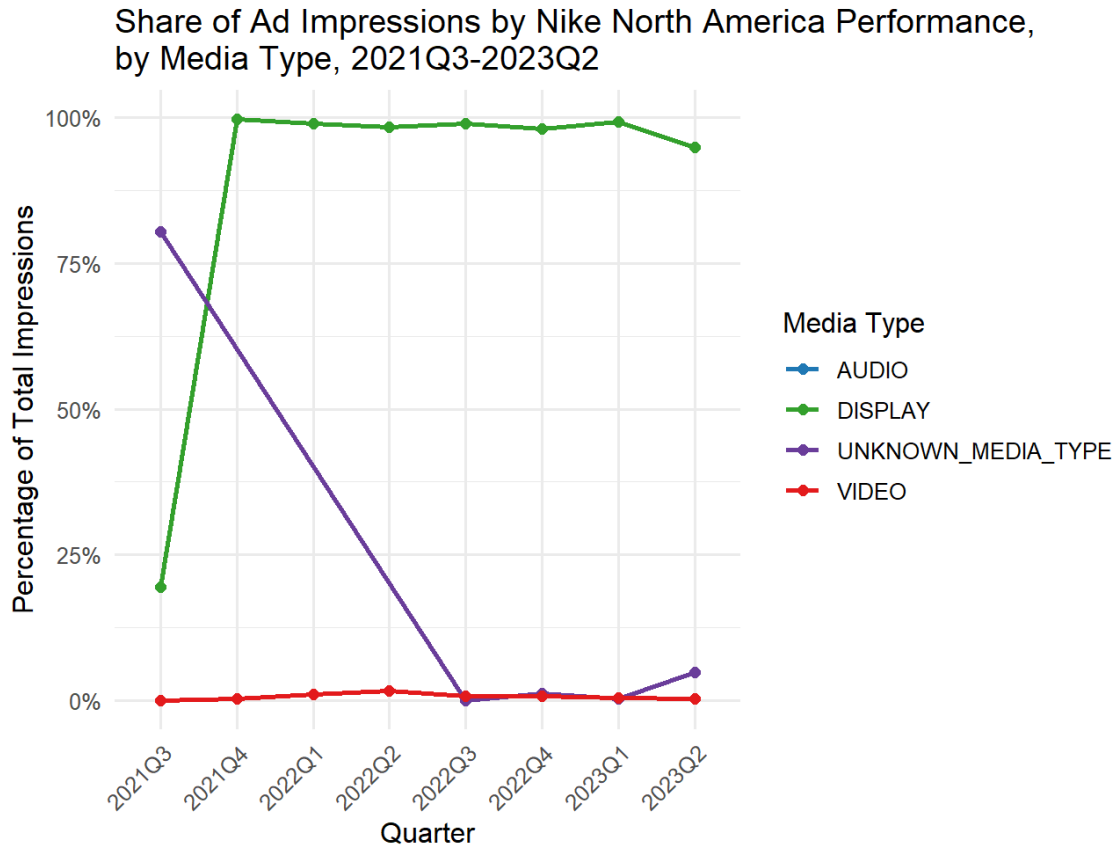
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163. In an attempt to show impartial representations of the data, I created the following graphs using the same methodology the Ghose Report used for its selection. These graphs are for the top ten advertisers in terms of impressions.

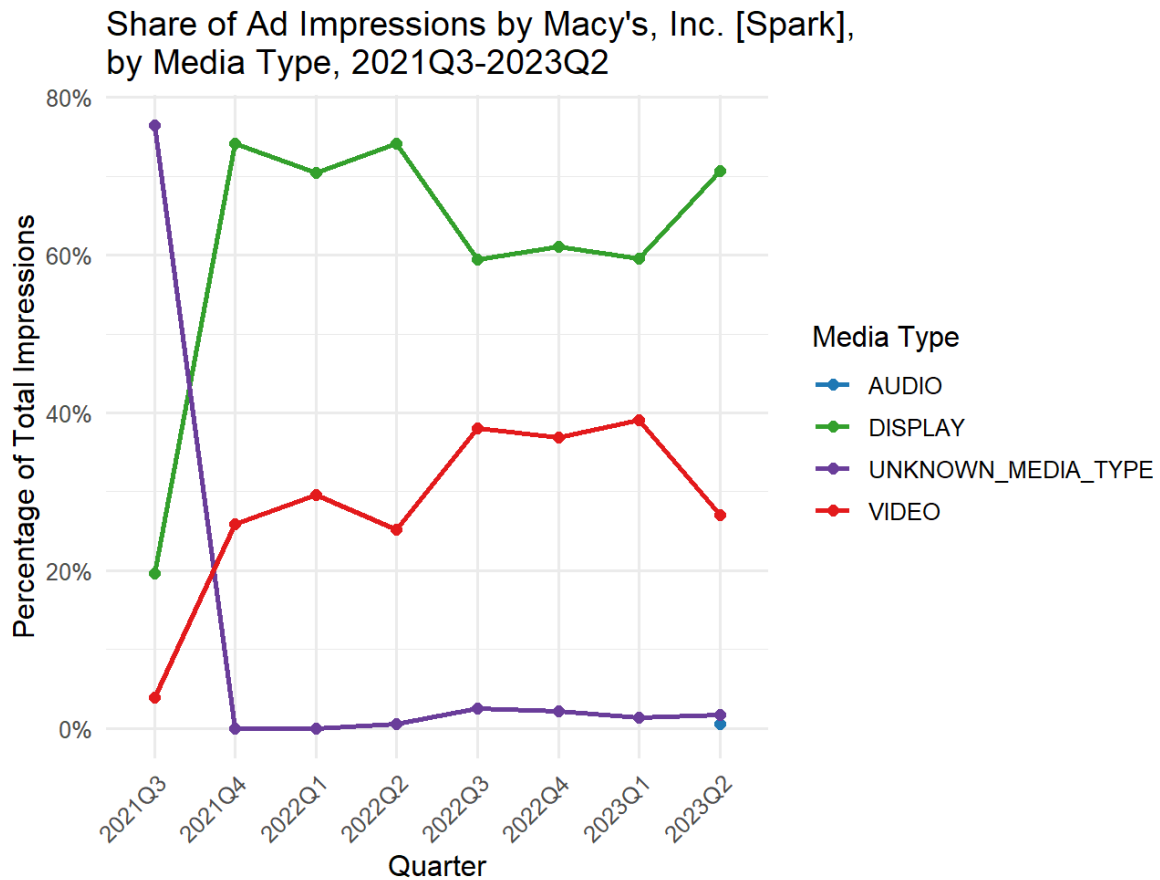


164. Progressive Direct Insurance Company shows a close share of display and video impressions that does shift overtime, which reinforces my points rather than those stated in the Ghose Report. Here we do see a shift of spend between display and the distinct channel of video. But this change takes place over six months and coincides with the ending of a Progressive fiscal year. Presumably at the end of 2022, Progressive decided to begin a slow shift from display to video, reflecting the challenges of channel reallocation for even the largest and most sophisticated marketers.

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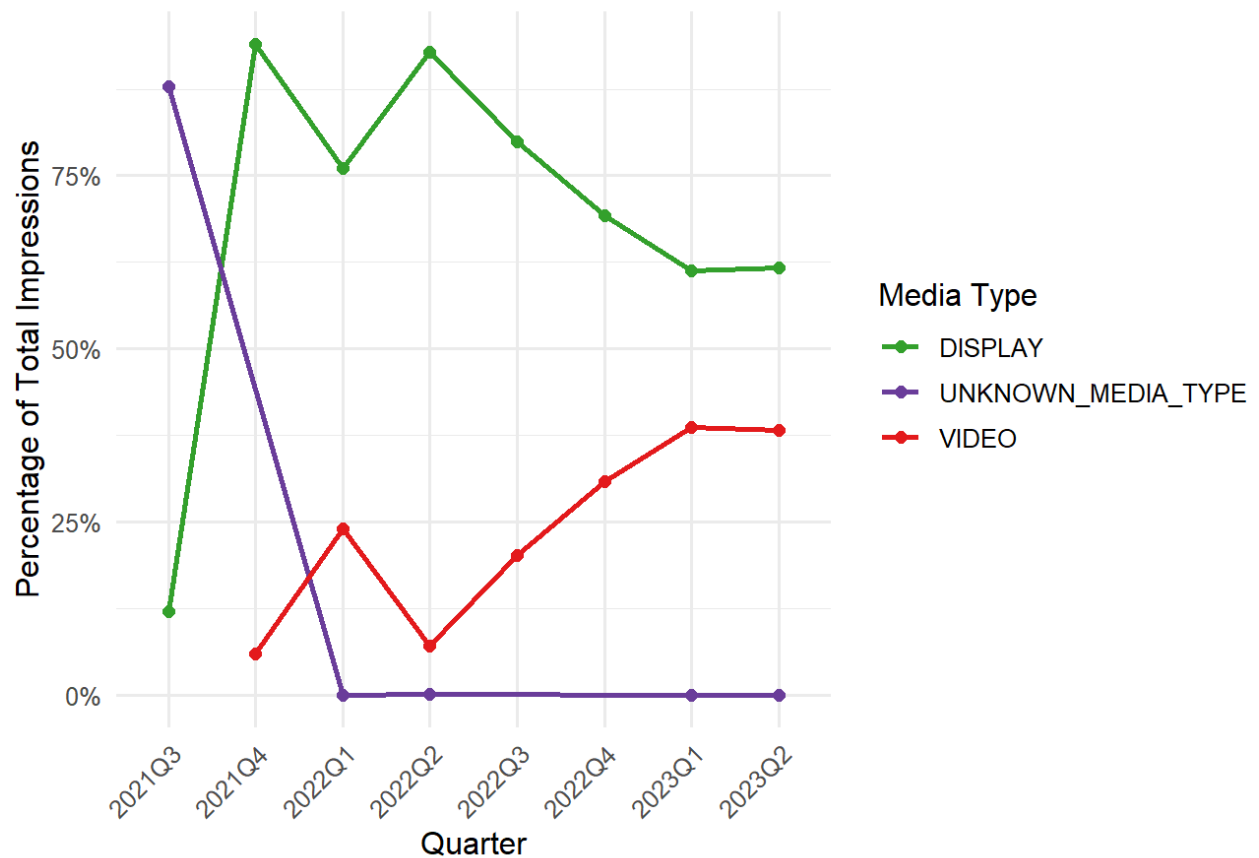
165. Nike's performance media shows an extremely steady portion of impressions being spent in display.

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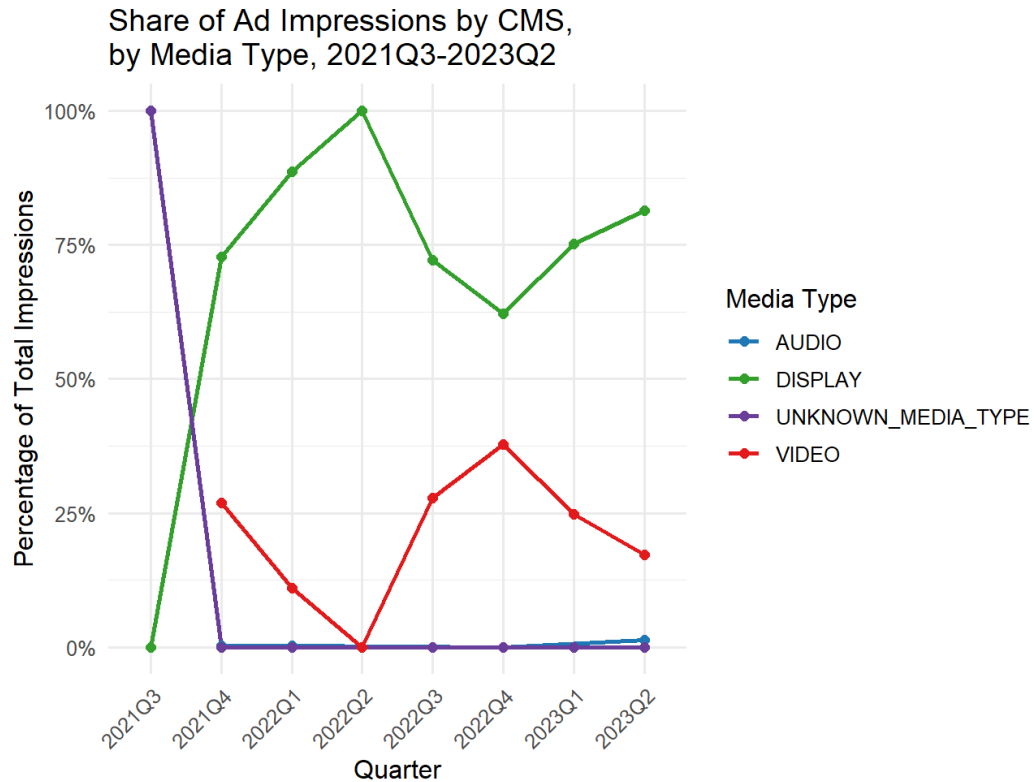
166. Macy's, Inc. [Spark] shows the share of impressions for display maintains a majority owning roughly between 60-80% of total impressions from 2021 Q4 to 2023 Q2.

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Share of Ad Impressions by Lowe's Home Improvement,
by Media Type, 2021Q3-2023Q2

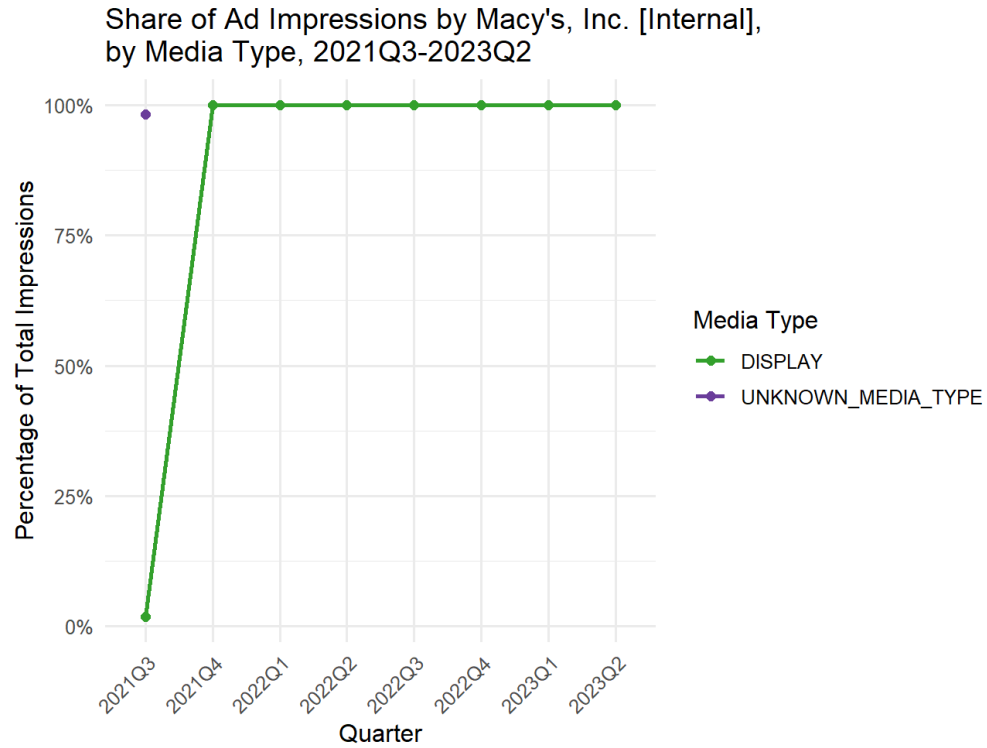


167. The changes in allocation between video and display for Lowe's further underscores the points I made above—these changes take place slowly and are subject to annual and quarterly reviews. I have not generally seen advertisers able to make rapid budget reallocations across channels in the data the Ghose Report analyzes.

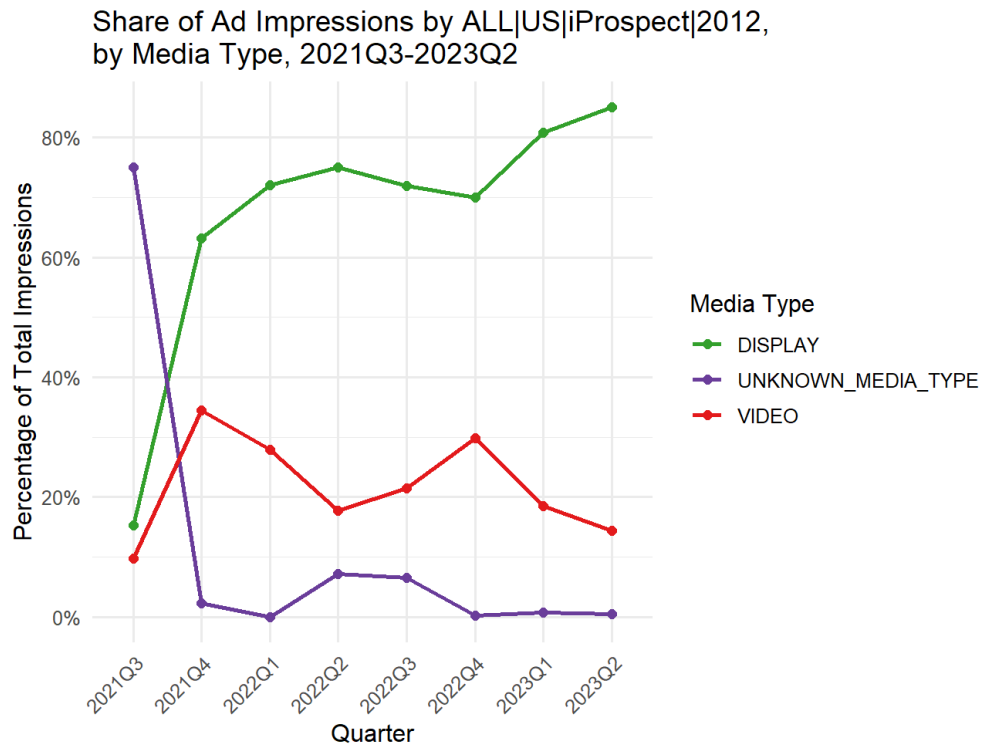
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168. This advertiser, CMS,²⁰⁰ shows slow, modest shifts in spend between channels, particularly once the unknown media type is taken into account.

²⁰⁰ The definition of “CMS” is not clear in the documentation. The U.S. Centers for Medicare & Medicaid Services uses the acronym CMS and may advertiser at this scale.

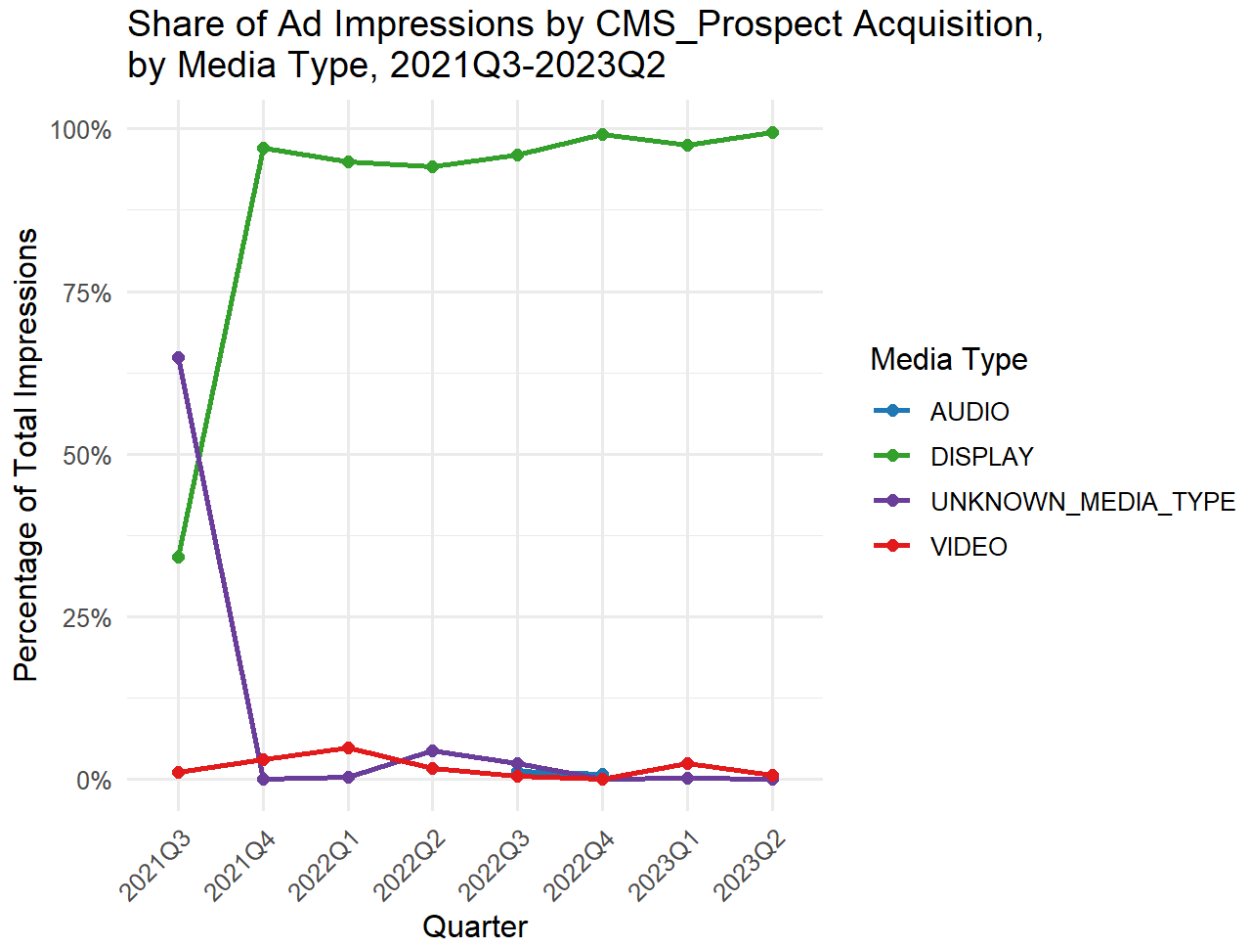
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169. This Macy's Internal advertiser shows no variability in channel mix across the two years.

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170. For iProspect's advertisers in the graph above, display impressions are relatively steady over time, ignoring the unknown in the first quarter.

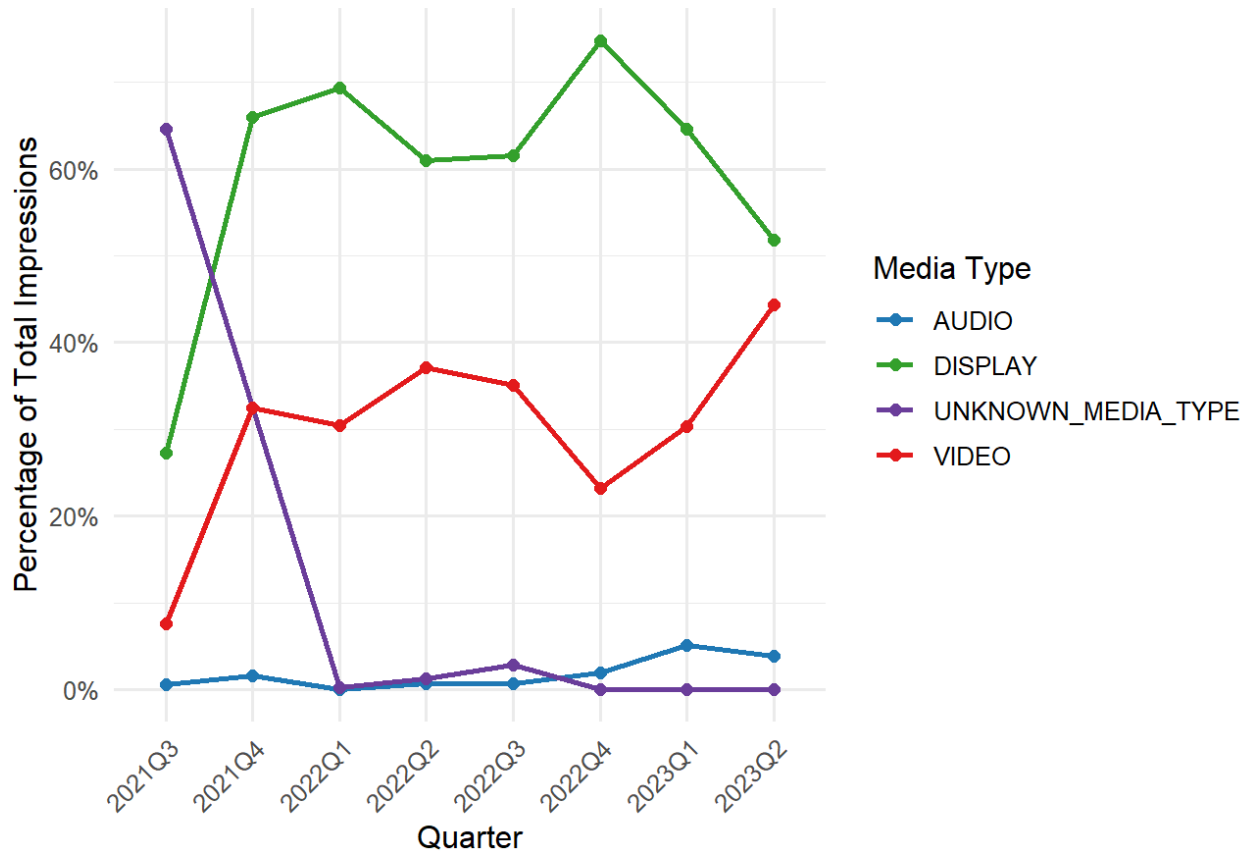
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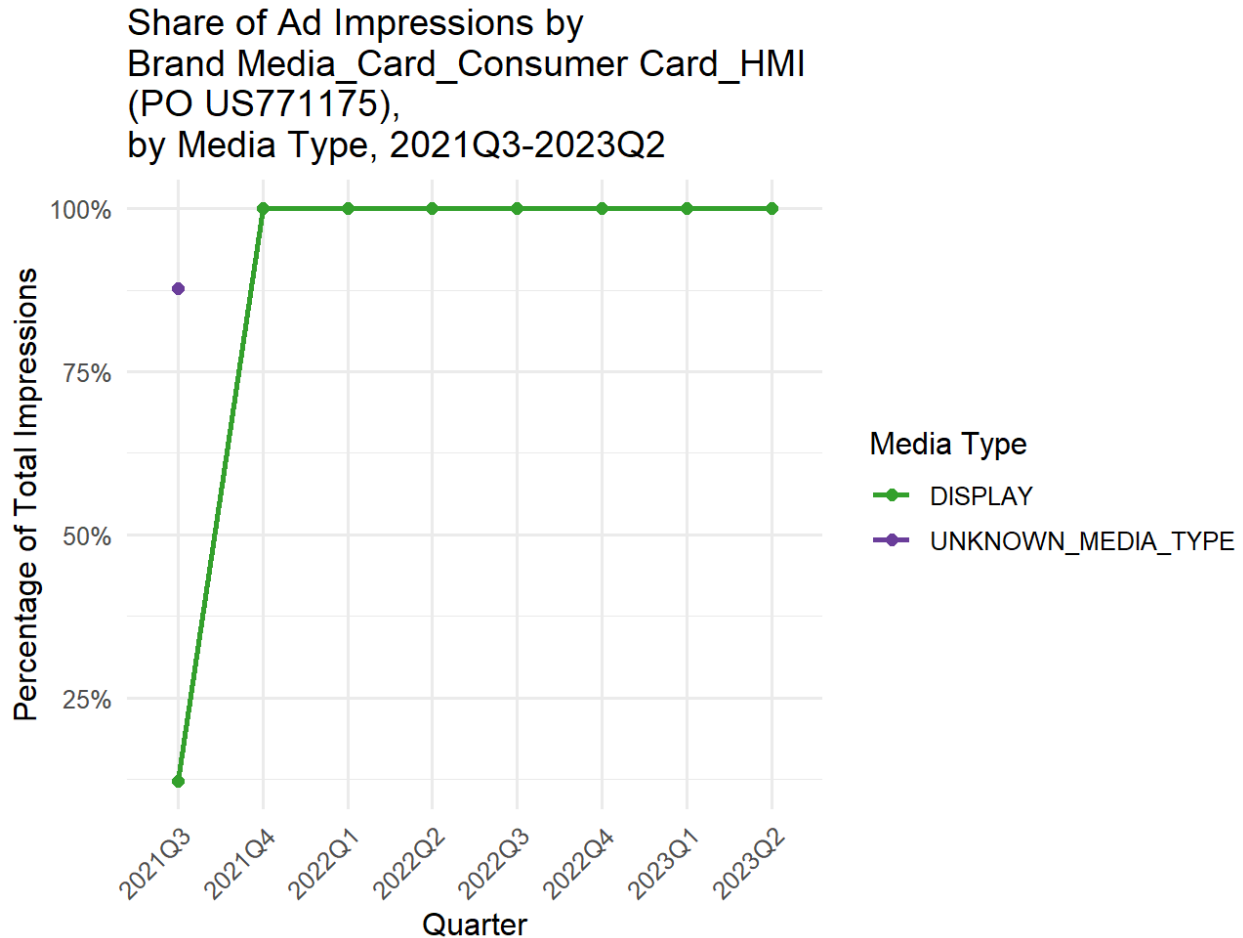


171. The “Prospect Acquisition” campaign for CMS again shows display impressions being essentially flat over the full time range, again ignoring the ‘unknown’ in the first quarter.

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Share of Ad Impressions by Air Force,
by Media Type, 2021Q3-2023Q2



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172. The marketing activity shown for this “consumer card” advertiser indicates that the only diversity in media spend comes from a portion of marketing in the first quarter being classified as “unknown.”

173. Based on my review of the data and the analyses I have done in this section, the three advertisers the Ghose Report included (Nike North America Brand, Macy’s Media Network (MMN), and Amex - Global Advertising) were cherry-picked and not representative of the corpus of advertiser impressions.

B. Category Four Error Conflating Modern Practice with Past Practice

174. Another erroneous dimension of the homogeneity in the Milgrom, Ghose and Baye Reports is temporal homogeneity. All three draw extensively on examples from contemporary marketing practice, which does not reflect the reality of the Ad Tech environment ten to fifteen years prior.²⁰¹

²⁰¹ Ghose Report ¶¶ 126-129. (Ghose makes a broad claim that there is heterogeneity in budget allocation based on ad format from data limited 2021 Q3 - 2023 Q2 for three advertisers.) Ghose

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175. Over the years that Google rose to its singular, dominant position in the ad tech industry, the auction environment evolved dramatically.²⁰² As seen above, Google’s customers and competitors struggled to understand the shifting marketplace that Google created. The models of both advertisers and publishers that the Milgrom, Ghose, and Baye Reports draw on do not reflect this reality.

IX. Category Five: Channel False Equivalences by the Ghose Report

176. In Section III of the Ghose Report makes numerous errors while attempting to make the point that display is substitutable with other channels such as video and social media. The basis of the report’s argument is a specious set of claims that highlight partial similarities of channels across a variety of dimensions, then leaping to the conclusion that the channels are substitutable. At the root of the report’s claim lies an inaccurate account of the advertising funnel.²⁰³

A. Category Five Error Related to Misunderstanding the Advertising Funnel

177. The Ghose Report fails to appreciate that marketing from different channels can fill multiple spots in the advertising funnel. The Ghose Report states “[a]dvertisers use display advertising for a variety of purposes, including creating brand awareness, developing consumer interest and desire, and driving sales.” The Ghose Report disagrees with my channel differentiation, stating that I “artificially distinguish it from other forms of digital advertising that can be used for one or more of these very same functions.”²⁰⁴ This argument is specious. A bus, a car and a bicycle can all be used to grocery shop, visit friends, and commute to work. According to the logic laid out in the Ghose Report, differentiation between them is “artificial” because they can be used for the same tasks.

Report ¶ 18. (Ghose ignores the growth of apps over the time period at issue, ‘It is artificial and outdated to claim that users of “open web” are distinct from users of mobile apps, social media, retailer platforms, or CTV properties. There has been significant convergence between users of social media with users of the so-called “open web.” In addition, it is inconsistent to state that there are significant differences between users of the mobile web, which is within the Plaintiff’s concept of “open web display,” and users of mobile apps, which are excluded.”)

²⁰² Opening Report ¶¶ 97-105.

²⁰³ Ghose Report § III.A. Advertisers can substitute between a variety of ad formats that serve similar functions; Ghose Report § III.C. Advertisers and publishers can substitute between direct and indirect ad placements.

²⁰⁴ Ghose Report ¶ 18.

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178. The Ghose Report echoes my points that display advertising can be used in different parts of the funnel,²⁰⁵ but then incorrectly extends that point to say that display is therefore substitutable with other marketing channels.²⁰⁶ To illustrate the weakness of this point, I extend the argument of the Ghose Report to two channels that no one would consider substitutable and that are not at issue in this case: display and branded search marketing. While both branded search and retargeting are considered lower-funnel strategies aimed at driving conversions, they serve distinct purposes and are not substitutable.²⁰⁷ Branded search involves targeting users who explicitly search for a brand or product by name. These users are usually further along in their purchase journey, demonstrating a clear intent to buy or gather specific information. The effectiveness of branded search lies in capturing demand from highly motivated consumers actively seeking the brand, often translating to higher conversion rates and a direct impact on sales.

179. On the other hand, retargeting focuses on re-engaging users who have previously interacted with a brand's website or digital content but did not finalize a purchase. This approach leverages behavioral data to remind potential customers of products or services they showed interest in, aiming to bring them back to complete their transactions. Although both strategies aim to convert interested consumers, retargeting is more about nurturing and guiding undecided prospects towards a decision, whereas branded search capitalizes on pre-existing strong intent. Each plays a unique role in the conversion process, and therefore, they complement rather than replace one another in a comprehensive lower-funnel marketing strategy.

180. Extending this examination to CTV, social media, and native ads reveals a similar pattern of distinct, non-substitutable roles despite potential overlaps in the marketing funnel. CTV, for example, offers a compelling way to reach audiences with

²⁰⁵ Ghose Report ¶ 30 (“Research has shown that digital display ads contribute to multiple objectives at different stages in the consumers’ purchase process, including increasing active searches and passive searches along with brand awareness, conversions, and sales.”)(citing to Anindya Ghose, and Vilma Todri-Adamopoulos, Toward a Digital Attribution Model: Measuring the Impact of Display Advertising on Online Consumer Behavior, MIS Quarterly, Vol. 40, No. 4, 2016, pp. 889-910 at p. 890; and Garrett Johnson, Randall A. Lewis, and Elmar Nubbemeyer, The Online Display Ad Effectiveness Funnel & Carryover: Lessons from 432 Field Experiments, SSRN, 2017.).

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2701578; Brett R. Gordon, Robert

Moakler, and Florian Zettelmeyer, Close Enough? A Large-Scale Exploration of Non-Experimental Approaches to Advertising Measurement, *Marketing Science Institute Working Paper Series*, Report No. 22-106, 2022, pp. 1-39. https://www.msi.org/wp-content/uploads/2022/03/MSI_Report_22-106.pdf; and, How to choose the right ad objective in Meta Ads Manager, Meta Business Help Center, available at <https://www.facebook.com/business/help/1438417719786914>.)

²⁰⁶ Ghose Report ¶ 30.

²⁰⁷ Opening Report §IV.D. and §V.

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engaging, high-quality video content that can drive both brand awareness and conversions, though it is typically deployed for upper funnel persuasion.²⁰⁸ And while CTV can operate at various stages of the funnel, including reinforcing brand messages and encouraging immediate actions, its immersive nature and viewing context set it apart from other channels. Display advertising, in comparison, may lack the emotional engagement of a full-screen video ad but compensates with precision targeting and cost efficiency, making it uniquely valuable for driving specific actions or engagement. In order to consider these interchangeable, the Ghose Report sets aside these distinctions.

181. Social media advertising similarly spans multiple stages of the funnel, from raising awareness to driving engagement and conversions through interactive and highly personalized content.²⁰⁹ Platforms like Facebook and Instagram allow for nuanced audience targeting and retargeting based on user behavior and preferences.²¹⁰ However, the social media environment fosters a level of community interaction and content sharing that display ads typically do not. Despite both channels potentially targeting users ready to convert, the social setting and engagement-driven dynamics of social media advertising are distinct from the primarily transactional focus of display ads.

182. Native ads also offer a unique proposition by blending seamlessly into the content that users are consuming, making them less intrusive and more engaging. They can serve effectively at various funnel stages by providing informative or persuasive content that aligns with the user's context. The subtle, content-driven approach of native ads, however, differs significantly from the more direct and visually-oriented strategies employed by display ads. While display ads can drive immediate actions with clear calls to action, native ads foster deeper engagement by aligning with the user's content consumption habits.

183. In all cases, while display advertising can operate at similar points in the funnel as CTV, social media, and native ads, its unique mechanisms, strengths,

²⁰⁸ Opening Report ¶¶ 69-73.

²⁰⁹ Liadeli, G., Sotgiu, F., and Verlegh, P.W.J. "A Meta-Analysis of the Effects of Brands' Owned Social Media on Social Media Engagement and Sales." *Journal of Marketing* vol. 87, no. 3, pp. 406-427. 2023 ("Owned social media may elicit a different response among consumers along the purchase funnel, resulting in a different effectiveness of owned social media on social media engagement and sales." Internal citation omitted.).

²¹⁰ Appel, G., Grewal, L., Hadi, R., and Stephen, A.T. "The Future of Social Media in Marketing." *Journal of the Academy of Marketing Science* vol. 48, pp. 79-95. 2020. <https://doi.org/10.1007/s11747-019-00695-1> (Discusses research on Facebook, Instagram, and Twitter use of influencers in marketing stating that influencers can, "have strong and enthusiastic followings that are usually more targeted").

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and contextual fit render it a distinct channel.²¹¹ This differentiation ensures that each form of advertising retains its specific role within an integrated marketing strategy, complementing but not substituting one another.

184. The Ghose Report argues that the traditional marketing funnel is an outdated model, suggesting that the “customer decision journey” provides a more accurate representation of modern consumer behavior. This distinction between the funnel and the customer decision journey, however, is not critical to understanding the effectiveness of various advertising channels. Both models acknowledge multiple touchpoints and stages through which consumers interact with brands. The funnel is regularly used in contemporary marketing strategies.²¹²

²¹¹ Opening Report ¶ 82.

²¹²



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185. The essential insights gained from the marketing funnel remain valid and applicable within the framework of the customer decision journey. For instance, both models recognize that consumers engage with different types of advertising from awareness to conversion. Thus, it is my opinion that display advertising, therefore, retains its significant role across various stages or touchpoints, regardless of whether the process is viewed through the lens of a linear funnel or a more fluid journey.

186. Furthermore, just as display advertising's versatility is acknowledged in the funnel model, it holds true in the context of the customer decision journey. Whether consumers are encountering ads at the awareness stage, being retargeted with relevant messages, or interacting with branded search as part of their decision-making process, display ads are uniquely capable of delivering impactful interactions across the spectrum.

187. Thus, while the terminology and structure of the consumer path may evolve, the principles underlying effective advertising strategies, including the vital contributions of display ads, remain consistent. Different channels, whether analyzed through the funnel or the customer decision journey, continue to complement each other in engaging consumers, guiding them through their purchase decisions, and ultimately driving conversions.

B. Category Five Error Related to Misunderstanding the Nature of Audience Overlap

188. The Ghose Report argues that the populations of open web display advertising, social media, mobile apps, and digital video audiences have largely converged, suggesting that these platforms reach the same users. However, this perspective oversimplifies the diversity in how people use these channels and the contexts in which they engage with them.

189. Firstly, demographic differences shape how various channels are consumed. Display advertising on the open web often skews towards older demographics, who are more inclined to use desktops or laptops for browsing and purchasing.²¹³ In contrast, social media platforms like Instagram and TikTok have a

²¹³ Peterson, Brian, The Link Between Device Usage and Age: Impacts on Results, July 12, 2021, accessible at <https://emi-rs.com/2021/07/12/the-link-between-device-usage-and-age-impacts-on-results/>, (accessed on September 7, 2024) ("When device usage is broken down by age group, it is clear that younger respondents are more likely to be taking a survey on a mobile device, whereas older respondents are more likely to use a desktop. 79% of respondents aged 18-24 use a smartphone

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substantially younger user base, who are more engaged in these channels for their interactive and community-centric features.²¹⁴ Even though there is overlap in user populations, the distinct age groups and their differing online behaviors matter significantly for advertisers aiming to reach targeted audiences.

190. Additionally, the context in which people consume content varies dramatically between channels. CTV is typically consumed at home in a communal setting, where users are more engaged and attentive to long-form content.²¹⁵ This consumption pattern contrasts sharply with mobile usage, where individuals often interact with apps and mobile web content while on the go or when they are alone. For example, streaming a TV show on a big screen shares little in common with scrolling through a news feed on a smartphone, despite both devices potentially being owned by the same person.

191. Furthermore, the purposes and mindsets of users differ based on the platform. Users visiting news websites or blogs are generally seeking information or specific content, which aligns well with the strengths of display ads. In contrast, social media users are typically looking to connect with friends, share experiences, or be entertained, making social media ads more engaging when they include interactive elements or personal relevance. Even though these users might overlap, their expectations and interactions with ads are dictated by the platform they are on.

192. Therefore, while statistical overlaps in user populations exist, the argument of the Ghose Report overlooks the crucial differences in how these platforms are used. Advertising strategies must consider these behavioral and demographic nuances to effectively target and engage audiences. Simply put, even if the same individuals access multiple platforms, their context, intent, and engagement on each one are different—reinforcing the need for distinct advertising approaches. The distinction I make about reaching different types of audiences is unchanged and is critical for understanding effective ad placement and targeting.

to take surveys while 76% of those 75 and older use a desktop, and we can see that device usage shifts incrementally with each age group in between.”).

²¹⁴ Hruska, J., & Maresova, P. (2020). Use of social media platforms among adults in the United States—behavior on social media. *Societies*, 10(1), 27 (“Instagram activity is mostly about posting photos; it is clear that lower ages have higher Instagram activity.”).

²¹⁵ Zillich, A.F. “Socially Shared Television Viewing: Preconditions, Processes and Effects of Co-viewing and Social TV.” In *How We Use the Media*, edited by B. Krämer and F. Frey, Palgrave Macmillan, Cham, 2020. Transforming Communications – Studies in Cross-Media Research. https://doi.org/10.1007/978-3-030-41313-2_7 (Report focuses on how users watch television together, this chapter considers common social arrangements, motives, selection decisions, as well as users’ interactions during co-viewing.).

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C. Category Five Error Related to Misunderstanding Targeting

193. The Ghose Report contends that the targeting capabilities of social media, app properties, and open web display ads are not fundamentally different, overstating these similarities to reinforce its substitutability points. While it is true that various platforms offer a range of targeting options, it is crucial to recognize that the quality and availability of data, as elaborated upon below, significantly impact the effectiveness of these targeting strategies.

194. Firstly, the quality of the data sets social media and search engines apart from display. Search engines, termed the “database of intentions,”²¹⁶ capture explicit user intent in a way unmatched by other platforms. When users actively search for a product or service, their actions provide clear signals about their needs and desires. Display advertising, on the other hand, frequently relies on modeled demand, which is based on user behavior and profiles inferred from browsing patterns.²¹⁷ While both methods can be effective, they serve different purposes: search ads are exceptionally precise due to clear intent,²¹⁸ whereas display ads excel in prospecting and raising initial interest among broader audiences.

195. Secondly, data availability and granularity²¹⁹ vary widely across platforms. Social media networks like Facebook gather extensive first-party data directly from user interactions, connections, and engagements within their “walled garden.” This data, partially derived from a user’s social graph, offers nuanced insights that are difficult to replicate through third-party data appends used on the open web. Demographic data available on open web platforms often lack the depth

²¹⁶ John Battelle, *The Search: how Google and its rivals rewrote the rules of business and transformed our culture* (2005).

²¹⁷ Gharibshah, Z., Zhu, X., Hainline, A., and Zhang, A. “Deep Learning for User Interest and Response Prediction in Online Display Advertising.” *Data Science and Engineering* vol. 5, pp. 12–26. 2020. <https://doi.org/10.1007/s41019-019-00115-y> (“User interest and behavior modeling is a critical step in online digital advertising. On the one hand, user interests directly impact their response and actions to the displayed advertisement (Ad). On the other hand, user interests can further help determine the probability of an Ad viewer becoming a buying customer.”).

²¹⁸ This point about search is axiomatic—the user’s query is the intent and search is the “database of intentions” as John Battelle writes.

²¹⁹ “Data granularity is a measure of the level of detail in a data structure. In time-series data, for example, the granularity of measurement might be based on intervals of years, months, weeks, days, or hours. For ordering transactions, granularity might be at the purchase order level, or line item level, or detailed configuration level for customized parts. The name field could represent the full name or have separate entries for first name, middle name, and last name.” C3 AI. “Data Granularity.” Accessed on August 30, 2024. <https://c3.ai/glossary/features/data-granularity/>.

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and immediacy of first-party data from social media, limiting the precision with which audiences can be targeted.²²⁰

196. Moreover, in-app advertising leverages real-time data to optimize ad displays dynamically. The ability to adjust targeting parameters on the fly based on real-time user behavior in apps provides a distinct advantage in responsiveness and relevance compared to the more static data typically utilized for open web display ads.²²¹

197. Additionally, while users employ various digital platforms, the context and engagement on each platform differ significantly. An Instagram user's engagement with ads is often social and leisure-oriented, whereas their interactions on CNBC.com might be more professionally focused. The way users interact with ads on the open web, frequently in an information-seeking or browsing context, presents yet another distinct scenario. Hence, the multi-faceted nature of user behavior across platforms means that the targeting potentials are not interchangeable but rather complementary, necessitating platform-specific strategies for maximizing ad effectiveness.

198. In summary, while the technical capabilities for targeting—using demographics, location, interests, and behaviors—may exist across multiple platforms, the quality, immediacy, and context of the data vary significantly. Search engines provide precision through intent data, social media platforms offer rich insights from social interactions, and in-app environments deliver dynamic real-time targeting. It is my opinion that acknowledging these distinctions is crucial for understanding why these targeting methods are not merely substitutable, but rather serve unique roles in a diversified advertising ecosystem.

X. Reservation of Rights

199. My opinions and analysis are based upon the information available to me to date. I may review and consider additional information that may be produced by the parties to this dispute. I intend to supplement my opinions, if it is appropriate to do so. I also reserve the ability to provide rebuttal opinions and testimony in this matter, to create demonstratives for use at trial based upon the information

²²⁰ Shopify has a useful guide comparing Google Ads targeting to Facebook Ads, “While Google leans more on keywords to find an ads audience, Facebook taps into its user data to pinpoint a business’s ideal customer.” <https://www.shopify.com/blog/google-ads-vs-facebook-ads>. Last Accessed September 5, 2024.

²²¹ Truong, V. N. X., Nkhoma, M., & Pansuwong, W. (2019). An integrated effectiveness framework of mobile in-app advertising. *Australasian Journal of Information Systems*, 23. (“Compared to mobile website advertising, in-app advertising can be related to personal information collected with a global positioning system (GPS) (Hirose, Mineo & Tabe 2017).”).

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contained in this report, appendices, and exhibits, and generally to utilize other graphical depictions as aids in the presentation of my findings.

APPENDIX A

JOHN CHANDLER

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EDUCATION

University of Montana

Ph.D. in Mathematical Sciences

2010

Dissertation: Statistical Learning in Online Advertising

University of Washington

MS in Mathematics

1999

Thesis: Visualizing Network Flows

Middlebury College

BA in Mathematics (Magna Cum Laude, Thesis Honors)

1996

Minor: Sociology

Thesis: Representations of Finite Groups

AWARDS

MS in Business Analytics Outstanding Faculty Award

2017-2022

Outstanding Non-Tenure Track Faculty Award

2017, 2020

TEACHING EXPERIENCE

University of Montana

Clinical Professor

2014-Present

Co-developed curriculum for MS in Business Analytics. Developed courses Applied Data Analytics, Text Mining and Unstructured Data, Advanced Applied Modeling, Introduction to SQL, and Telling Stories with Data. Additionally, taught weekend and short courses.

Instructor

2007

Developed syllabus and taught "Simulations in R".

ORT University, Montevideo Uruguay

Visiting Professor

2018-Present

Annual teaching of Telling Stories with Data for analytics students and assistance with the development of business analytics degree.

University of San Diego

Adjunct Professor

2021-Present

Teaching Applied Text Mining (ADS-509) in the MS of Applied Data Science degree.

University of Washington

Instructor

1998-1999

Taught Calculus, Pre-Calculus, Linear Algebra, and Algebra

RELATED EXPERIENCE

Data Insights

Managing Partner

2012 – Present

Managed data science consulting practice, working with numerous Fortune 500 companies and start-ups.

Microsoft

Research Director

2007-2011

Data scientist at Microsoft, working across a variety of advertiser, publisher and auction products. Last position was leading research for Microsoft TV.

aQuantive

Principal Analyst

1999-2007

Data scientist working at the intersection of product, statistics and marketing.

BOOKS

Steele, B, J Chandler and S Reddy (2018). *Algorithms for Data Science*. New York: Springer-Verlag

PUBLICATIONS AND PAPERS

Smith, M. L., MacLehose, R. F., Chandler, J. W., & Berman, J. D. (2022). Thunderstorms, Pollen, and Severe Asthma in a Midwestern, USA, Urban Environment, 2007–2018. *Epidemiology*, 33(5), 624-632.

Earnest, D., & Chandler, J. (2021). Making time: Words, narratives, and clocks in elementary mathematics. *Journal for Research in Mathematics Education*, 52(4), 407-443.

Yung, L., Chandler, J., & Haverhals, M. (2015). Effective weed management, collective action, and landownership change in western Montana. *Invasive plant science and management*, 8(2), 193-202.

Yung, Laurie., Freimund, Wayn., & Chandler-Pepelnjak, John. (2008). Wilderness politics in the American West. *International Journal of Wilderness*, 14(2), 14-23.

WORKING PAPERS

Chandler, J. & Bu, X. "We will but I did: Collectivism versus individualism in political convention speeches". *Preparing for initial submission in PNAS*

Metcalf, A., Birdsong, M., & Chandler, J. "Private lands in the public trust". *Preparing for initial submission to Society and Natural Resources*

Chandler, J. "Violations of independence in network statistics". *Preparing for initial submission at Social Network Analysis*

CONSULTING REPORTS AND WHITE PAPERS

"Measuring ROI Beyond the Last Ad"	2009
"The Long Road to Conversion: The Digital Purchase Funnel"	2008
"Optimal Frequency: The Impact of Frequency on Conversion Rates"	2006
"Traditional Advertising Metrics on the Web: Forecasting GRP's, Reach and Effective Reach Online"	2007
"Forecasting Reach, Frequency, and GRPs on the Internet"	2004
"Atlas Annual Holiday Shopping Report"	2000-2007

PATENT APPLICATIONS

"System and method for determining internet advertising strategy" US20030074252A1; with A Easterly	2003
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INVITED TALKS

"Teaching Analytics in the Age of AI" Universidad ORT Uruguay	2024
"DevOps is Data Science" Data Tech	2019
"Measuring Marketing Effectiveness" Universidad ORT Uruguay	2019
"Data Science is Dev-Ops" University of Montana	2018
"Marketing Science at Tableau" Tableau Conference	2018
"The Collision of Data Science and Marketing" University of Montana	2015
"Causal Inference is Hard", Panel Discussion	

Advertising Research Foundation 2014

"Understanding Attribution"

Advertising Research Foundation 2012

DEGREE COMMITTEES

- Tina Cummins, MS in Economics, 2017, *Impact of local government revenue and spending during oil and gas booms in the Rocky Mountain States*
- Omid Khormali, Ph.D. in Mathematica Sciences, 2019, *Extremal problems for forests in graphs and hypergraphs*
- Hannah Leonard, MS in Forestry, 2020, *A Conservation Marketing Toolkit: Systematic Literature Mapping, Microtargeting Conservation Easements, and Conservation Corridor Prioritization*
- Nate Bender, MS in Forestry, 2022, *Call your elected officials: Identifying predictors and audiences for collective climate action*
- Madeline Damon, MS in Forestry, 2023, *INVESTIGATING INTELLECTUAL DIVERSITY: A CRITICAL EXAMINATION OF ACADEMIC PUBLISHING PRACTICES AND THEIR EFFECTS ON WILDLIFE CONSERVATION*
- Tina Cummins, Forestry Ph.D., in progress
- Anna Marbut, Interdisciplinary Ph.D., in progress
- Chelle Twilliger, Ph.D in Forestry, in progress

LANGUAGES

English—native language

Spanish—speak, read, and write with competence

MEMBERSHIPS

American Marketing Association

American Statistical Association

APPENDIX B

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**APPENDIX B: PRIOR TESTIFYING
HISTORY OF DR. JOHN CHANDLER, Ph.D.**

1. **In Re: JUUL Labs, Inc. Marketing, Sales Practices and Products Liability Litigation, Case No. 19-md-02913-WHO (N.D. Cal. 2019)**
 - **Deposed in July, 2021; October, 2021; and May, 2022.**
2. **The State of Alaska v. JUUL Labs, Inc., et al., Case No. 3AN-20-09477, In the Superior Court of Alaska, Third Judicial District, Anchorage, Alaska (2020)**
 - **Deposed in April, 2024 and July, 2024.**
3. **Iola Favell, et al. v. University of Southern California and 2U, Inc., Case No. 2:23-cv-00846-GW-MAR (C.D. Cal. 2023)**
 - **Deposed in August, 2024.**

APPENDIX C

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Appendix C: Materials Relied Upon & Materials Considered in September 9, 2024 Expert Rebuttal Report of John Chandler, Ph.D.

MATERIALS RELIED UPON

Publicly Available Materials

1. The Wall Street Journal. “Consumers Are Likely to Turn to Web For Holiday Shopping, Analysts Say” (November 21, 2001). Accessed on June 3, 2024. <https://www.wsj.com/articles/SB1006378597369697160>.
2. Click Z. “How One Advertiser Uses Microsoft Engagement Mapping” (May 12, 2008). Accessed on June 3, 2024. <https://www.clickz.com/how-one-advertiser-uses-microsoft-engagement-mapping/63267/>.
3. Salesforce. “Multi-touch Attribution Defined.” Accessed on August 30, 2024. <https://www.salesforce.com/marketing/multi-touch-attribution/>.
4. Digiday. “WTF is multi-touch attribution?” (August 30, 2019). Accessed on June 6, 2024. <https://digiday.com/marketing/what-is-multi-touch-attribution/>.
5. Studies using Multitouch attribution models: Li, H. (Alice), and Kannan, P. K. “Attributing Conversions in a Multichannel Online Marketing Environment: An Empirical Model and a Field Experiment.” *Journal of Marketing Research*, vol. 51, no. 1, 2014, pp. 40-56. <https://doi.org/10.1509/jmr.13.0050>
6. Berman, Ron. “Beyond the Last Touch: Attribution in Online Advertising.” University of Pennsylvania - The Wharton School, March 24, 2018. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2384211
7. Zhao, K., Mahboobi, S. H., and Bagheri, S. R. “Attributing Revenue Across Online Advertising Channels.”, an article in Mouncey, P. “IJMR Editorial.” *International Journal of Market Research*, vol. 61, no. 2, 2019, pp. 124-125. <https://doi.org/10.1177/1470785318817682>
8. Chandler-Pepelnjak, J. “Measuring ROI beyond the last ad.” Atlas Institute Digital Marketing Insight. 2009. pg. 1-6. (“Chandler-Pepelnjak (2009)”)
9. Kitts, Brendan, et al. “System and Method for Determining Effects of Multi-Channel Media Sources on Multi-Channel Conversion Events.” U.S. Patent No. 11,042,897, June 22, 2021
10. Anderl, Eva, et al. “Putting Attribution to Work: A Graph-Based Framework for Attribution Modeling in Managerial Practice.” *Social Science Research Network*, no. 2343077 (2013). Accessed on August 28, 2024. https://www.researchgate.net/profile/Eva-Anderl/publication/258316917_Mapping_the_Customer_Journey_A_Graph-Based_Framework_for_Online_Attribution_Modeling/links/5c1cbe82458515a4c7eea1cb/Mapping-the-Customer-Journey-A-Graph-Based-Framework-for-Online-Attribution-Modeling.pdf.

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11. Khan, Fawad, and Kamran Siddiqui. "The Importance of Digital Marketing. An Exploratory Study to Find the Perception and Effectiveness of Digital Marketing Amongst the Marketing Professionals in Pakistan." (2023).
12. Microsoft Corporation 2007 SEC Filing. Form 10-K for the Fiscal Year Ended June 30, 2007. U.S. Securities and Exchange Commission, Commission File No. 0-14278. <https://www.sec.gov/Archives/edgar/data/789019/000119312507170817/d10k.htm>.
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14. Tech Crunch. "Facebook Confirms It Will Acquire Atlas Advertiser Suite from Microsoft To Close The Ad Spend Loop" (February 28, 2013). Accessed on June 3, 2024. <https://techcrunch.com/2013/02/28/facebook-acquires-atlas/>.
15. Data Insights, LLC. "About Page, John Chandler". Accessed August 30, 2024. <https://www.datainsightsllc.com>.
16. Advertising Age. "Largest advertisers in the United States in 2022 (in billion U.S. dollars)." Chart. June 26, 2023. Accessed June 3, 2024. Accessed via <https://www.statista.com/statistics/275446/ad-spending-of-leading-advertisers-in-the-us/>.
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21. Jones Merritt, Deborah, and Cornett, Logan. Building a Better Bar: The Twelve Building Blocks of Minimum Competence. Institute for the Advancement of the American Legal System (Oct. 2020). <http://indisputably.org/files/2020/10/IAALS-OSU-Building-a-Better-Bar.pdf>.
22. Stringfellow, Lindsey, et al. "Mind the Gap: The relevance of marketing education to marketing practice." Marketing Intelligence & Planning (Apr. 2006). Accessed on August 27, 2024. https://www.researchgate.net/profile/Michael-Harker-2/publication/235310275_Mind_the_gap_The_relevance_of_marketing_educ

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Depositions

1. [REDACTED]
2. [REDACTED]
3. [REDACTED]
4. [REDACTED]
5. [REDACTED]
6. [REDACTED]
7. [REDACTED]
8. [REDACTED]
9. [REDACTED]
10. [REDACTED]
11. [REDACTED]
12. Deposition of [REDACTED] (former Google employee), *The State of Texas et al. v. Google LLC*, Case No. 4:20-cv-00957-SDJ (E.D. Tex.), May 23, 2024
13. [REDACTED]
14. [REDACTED]

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15. [REDACTED]
16. [REDACTED]
17. Deposition of [REDACTED] (Google LLC 30(b)(6) representative), *The State of Texas, et al. v. Google LLC*, Case No. 4:20-cv-00957-SDJ (E.D. Tex.), April 26, 2024
18. Deposition of [REDACTED] May 1, 2024, *The State of Texas et al. v. Google LLC*, Case No. 4:20-cv-00957-SDJ (E.D. Tex.), May 1, 2024
19. [REDACTED]

Bates Stamped Documents

1. [REDACTED]
2. GOOG-NE-09329279
3. [REDACTED]
4. GOOG-AT-MDL-001462938
5. GOOG-NE-06842715
6. GOOG-AT-MDL-007397182
7. GOOG-DOJ-13989756
8. GOOG-AT-MDL-B-004435235
9. GOOG-DOJ-13997420
10. GOOG-DOJ-15432090
11. GOOG-NE-13293533
12. GOOG-DOJ-32277385
13. GOOG-DOJ-27760500
14. GOOG-DOJ-13932386
15. GOOG-TEX-00090151
16. GOOG-NE-05311570
17. GOOG-DOJ-15432090
18. GOOG-TEX-01022605
19. [REDACTED]
20. GOOG-NE-10493536
21. GOOG-DOJ-11790760
22. [REDACTED]
23. GOOG-DOJ-AT-01251555
24. GOOG-NE-05308050
25. GOOG-TEX-00030151
26. GOOG-NE-05308050.
27. GOOG AT DOJ DATA_000247044
28. [REDACTED]

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29. [REDACTED]

Expert Reports

1. ¹ Expert Report of John Chandler, Ph.D., June 7, 2024
2. Expert Report of Michael R. Baye, August 6, 2024
3. Expert Report of Anindya Ghose, Ph.D., July 30, 2024
4. Expert Report of Itamar Simonson, Ph.D., July 30, 2024
5. Expert Report of Paul R. Milgrom, July 30, 2024
6. Expert Report of Professor Steven N. Wiggins, July 30, 2024

MATERIALS CONSIDERED

Pleadings

The live pleadings (complaint and answer) within the matter of *The State of Texas, et al. v. Google*, Case Number: 4:20-cv-00957-SDC, including the Fourth Amended Complaint.

Discovery Responses

All available discovery responses produced within the matter of *The State of Texas, et al. v. Google*, Case Number: 4:20-cv-00957-SDJ, including:

1. The Parties' amended initial disclosures;
2. The Parties' discovery responses and objections to Interrogatories, Requests for Admission, and Requests for Production; and
3. Google's written responses to Plaintiffs' Rule 30(b)(6) Notice.

Deposition Transcripts & Exhibits

All available deposition transcripts and exhibits within the matter of *The State of Texas, et al. v. Google*, Case Number: 4:20-cv-00957-SDJ, including:

20. Deposition and Exhibits of [REDACTED], April 1, 2024
21. Deposition and Exhibits of [REDACTED], April 3, 2024
22. Deposition and Exhibits of [REDACTED], April 12, 2024
23. Deposition and Exhibits of [REDACTED], April 17, 2024
24. Deposition and Exhibits of [REDACTED], April 19, 2024
25. Deposition and Exhibits of [REDACTED], April 23, 2024
26. Deposition and Exhibits of [REDACTED], April 26, 2024
27. Deposition and Exhibits of [REDACTED], April 26, 2024
28. Deposition and Exhibits of [REDACTED], April 29, 2024
29. Deposition and Exhibits of [REDACTED], April 30, 2024
30. Deposition and Exhibits of [REDACTED], May 1, 2024
31. Deposition and Exhibits of [REDACTED], May 1, 2024
32. Deposition and Exhibits of [REDACTED], May 2, 2024
33. Deposition and Exhibits of [REDACTED], April 5, 2024

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34. Deposition and Exhibits of [REDACTED] . May 2, 2024
35. Deposition and Exhibits of [REDACTED] . May 10, 2024
36. Deposition and Exhibits of [REDACTED] , May 15, 2024
37. Deposition and Exhibits of [REDACTED] May 17, 2024
38. Deposition and Exhibits of [REDACTED] Vol 1, April 26, 2024
39. Deposition and Exhibits of [REDACTED] Vol 2, May 21, 2024
40. Deposition and Exhibits of [REDACTED] . May 21, 2024
41. Deposition and Exhibits of [REDACTED] , May 22, 2024
42. Deposition and Exhibits of [REDACTED] , May 23, 2024
43. Deposition and Exhibits of [REDACTED] . May 24, 2024
44. Deposition and Exhibits of [REDACTED] Vol 1, April 19, 2024
45. Deposition and Exhibits of [REDACTED] Vol 2, May 2, 2024
46. Deposition and Exhibits of [REDACTED] Vol 3, May 3, 2024
47. Deposition and Exhibits of [REDACTED] Vol 4, May 24, 2024
48. [REDACTED]
49. [REDACTED]
50. [REDACTED]
51. [REDACTED]
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67. [REDACTED]
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70. [REDACTED]

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71. [REDACTED]
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96. [REDACTED]
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97. [REDACTED]
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98. [REDACTED]
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99. [REDACTED]
100. [REDACTED]
101. [REDACTED]
[REDACTED]
102. [REDACTED]
[REDACTED]

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103. [REDACTED]

All available deposition transcripts and exhibits within the matter of *USA v. Google*, Case Number: 1:23-cv-00108-LMB-JFA, including:

104. [REDACTED]
105. [REDACTED]
106. [REDACTED]
107. [REDACTED]
108. [REDACTED]
109. [REDACTED]
110. [REDACTED]
111. [REDACTED]
112. [REDACTED]
113. [REDACTED]
114. [REDACTED]
115. [REDACTED]
116. [REDACTED]
117. [REDACTED]
118. [REDACTED]
119. [REDACTED]
120. [REDACTED]
121. [REDACTED]
122. [REDACTED]
123. [REDACTED]
124. [REDACTED]
125. [REDACTED]
126. [REDACTED]
127. [REDACTED]
128. [REDACTED]

- 129. Deposition and Exhibits of [REDACTED] (November, 11, 2023)
- 130. Deposition and Exhibits of [REDACTED] (August 15, 2023)
- 131. Deposition and Exhibits of [REDACTED] (November 14, 2023)
- 132. Deposition and Exhibits of [REDACTED] (November 15, 2023)
- 133. Deposition and Exhibits of [REDACTED] (November 14, 2023)
- 134. Deposition and Exhibits of [REDACTED] (30B6 errata only) (November 14, 2023)
- 135. Deposition and Exhibits of [REDACTED] (November 3, 2023)
- 136. Deposition and Exhibits of [REDACTED] (August 16, 2023)
- 137. Deposition and Exhibits of [REDACTED] (November 7, 2023)
- 138. Deposition and Exhibits of [REDACTED] (November 9, 2023)

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- 139. Deposition and Exhibits of [REDACTED] (October 30, 2023)
- 140. Deposition and Exhibits of [REDACTED] (August 11, 2023)
- 141. Deposition and Exhibits of [REDACTED] (November 2, 2023)
- 142. Deposition and Exhibits of [REDACTED] (November 16, 2023)
- 143. Deposition and Exhibits of [REDACTED] (August 29, 2023)
- 144. Deposition and Exhibits of [REDACTED] (November 14-15, 2023)
- 145. Deposition and Exhibits of [REDACTED] (April 1, 2024)
- 146. Deposition and Exhibits of [REDACTED] (November 3, 2024)
- 147. Deposition and Exhibits of [REDACTED] (November 3, 2024)
- 148. Deposition and Exhibits of [REDACTED] (30(b)6) (November 14, 2023)
- 149. Deposition and Exhibits of [REDACTED] (August 16, 2023)
- 150. Deposition and Exhibits of [REDACTED] (November 7, 2023)
- 151. Deposition and Exhibits of [REDACTED] (November 9, 2023)
- 152. Deposition and Exhibits of [REDACTED] (April 3, 2024)
- 153. Deposition and Exhibits of [REDACTED] (October 10, 2023 and November 8, 2023)
- 154. Deposition and Exhibits of [REDACTED] (April 17, 2024)
- 155. Deposition and Exhibits of [REDACTED] (April 29, 2024)
- 156. Deposition and Exhibits of [REDACTED] (November 11, 2023)
- 157. Deposition and Exhibits of [REDACTED] (October 10, 2023)

All available deposition transcripts and exhibits within the matter of *In re: Google Digital Advertising Antitrust Litigation*, Case Number: 1:21-md-03010-PKC, including the depositions and exhibits of:

- 158. [REDACTED] 6/19/2024
- 159. [REDACTED] 6/20/2024
- 160. [REDACTED]
- 161. [REDACTED]
- 162. [REDACTED]
- 163. [REDACTED] 6/25/2024
- 164. [REDACTED]
- 165. [REDACTED] 7/23/2024
- 166. [REDACTED] 7/23/2024
- 167. [REDACTED] 6/18/2024
- 168. [REDACTED]
- 169. [REDACTED]
- 170. [REDACTED] 7/10/2024
- 171. [REDACTED] 4/25/2024
- 172. [REDACTED] 7/10/2024
- 173. [REDACTED] 6/24/2024
- 174. [REDACTED] 7/12/2024
- 175. [REDACTED]
- 176. [REDACTED] 6/13/2024

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177.	[REDACTED]	5/2/2024
178.	[REDACTED]	[REDACTED]
179.	[REDACTED]	6/6/2024
180.	[REDACTED]	6/28/2024
181.	[REDACTED]	[REDACTED]
182.	[REDACTED]	6/4/2024
183.	[REDACTED]	[REDACTED]
184.	[REDACTED]	[REDACTED]
185.	[REDACTED]	6/25/2024
186.	[REDACTED]	6/26/2024
187.	[REDACTED]	6/10/2024
188.	[REDACTED]	[REDACTED]
189.	[REDACTED]	6/13/2024
190.	[REDACTED]	6/7/2024
191.	[REDACTED]	6/25/2024
192.	[REDACTED]	[REDACTED]
193.	[REDACTED]	[REDACTED]
194.	[REDACTED]	6/24/2024
195.	[REDACTED]	6/27/2024
196.	[REDACTED]	[REDACTED]
197.	[REDACTED]	[REDACTED]

Other available deposition transcripts and exhibits, including the depositions and exhibits of:

198.	[REDACTED]	10/2/2020
199.	[REDACTED]	10/16/2020
200.	[REDACTED]	7/28/2020
201.	[REDACTED]	7/21/2020
202.	[REDACTED]	10/26/2020
203.	[REDACTED]	11/6/2020
204.	[REDACTED]	7/31/2020
205.	[REDACTED]	9/25/2020
206.	[REDACTED]	10/20/2020
207.	[REDACTED]	7/17/2020
208.	[REDACTED]	11/9/2020
209.	[REDACTED]	11/19/2020
210.	[REDACTED]	7/24/2020
211.	[REDACTED]	7/14/2020
212.	[REDACTED]	11/10/2020

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213.	[REDACTED]	11/2/2020
214.	[REDACTED]	9/28/2020
215.	[REDACTED]	2/3/2022
216.	[REDACTED]	8/11/2021
217.	[REDACTED]	2/28/2022
218.	[REDACTED]	10/19/2021
219.	[REDACTED]	12/9/2021
220.	[REDACTED]	9/17/2021
221.	[REDACTED]	11/20/2020
222.	[REDACTED]	3/30/2021
223.	[REDACTED]	10/28/2021
224.	[REDACTED]	8/10/2021
225.	[REDACTED]	3/31/2021
226.	[REDACTED]	4/2/2021
227.	[REDACTED]	4/22/2021
228.	[REDACTED]	10/28/2021
229.	[REDACTED]	7/22/2021
230.	[REDACTED]	10/6/2021
231.	[REDACTED]	7/20/2021
232.	[REDACTED]	8/12/2021
233.	[REDACTED]	9/28/2021
234.	[REDACTED]	5/17/2021
235.	[REDACTED]	9/7/2021

Expert Reports & Declarations

All available expert reports, including appendices, backup materials, and cited materials, within the matter of *The State of Texas, et al. v. Google*, Case Number: 4:20-cv-00957-SDJ, including:

1. 2024.06.07 Expert Report of Jeffrey S. Andrien
2. 2024.06.07 Expert Report of Joshua Gans, as well as 2024.07.24 Errata and Supplemental Appendix D
3. 2024.06.07 Expert Report of Jacob Hostetler
4. 2024.06.07 Expert Report of John Chandler
5. 2024.06.07 Expert Report of Matthew Weinberg
6. 2024.06.07 Expert Report of Parag Pathak
7. 2024.07.30 Expert Report of Anindya Ghose
8. 2024.07.30 Expert Report of Donna L. Hoffman
9. 2024.07.30 Expert Report of Douglas Skinner

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10. 2024.07.30 Expert Report of Itamar Simonson
11. 2024.07.30 Expert Report of Martin C. Rinard
12. 2024.07.30 Expert Report of Paul R. Milgrom
13. 2024.07.30 Expert Report of Steven N. Wiggins
14. 2024.08.06 Expert Report of Michael R. Baye
15. 2024.08.06 Expert Report of Jason Nieh

All available expert reports (with redactions) within the matter of *USA v. Google*,
Case Number: 1:23-cv-00108-LMB-JFA, including:

1. Declarations of Google Employees
2. 2023.12.22 Expert Report of Gabriel Weintraub, GOOG-AT-MDL-C-000018734
3. 2023.12.22 Expert Report of R. Ravi, GOOG-AT-MDL-C-000019017
4. 2023.12.22 Expert Report of Robin S. Lee, GOOG-AT-MDL-C-000019273
5. 2023.12.22 Expert Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000019786
6. 2023.12.22 Expert Report of Thomas S. Respass, GOOG-AT-MDL-C-000020106
7. 2023.12.22 Expert Report of Timothy Simcoe, GOOG-AT-MDL-C-000020274
8. 2024.01.13 Errata to Abrantes-Metz Expert Report, GOOG-AT-MDL-C-000020435
9. 2024.01.13 Errata to Ravi Expert Report, GOOG-AT-MDL-C-000020437
10. 2024.01.13 Errata to Respass Expert Report, GOOG-AT-MDL-C-000020440
11. 2024.01.13 Errata to Simcoe Expert Report, GOOG-AT-MDL-C-000020467
12. 2024.01.13 Errata to Weintraub Expert Report, GOOG-AT-MDL-C-000020471
13. 2024.01.23 Chevalier Expert Report, GOOG-AT-MDL-C-000020474
14. 2024.01.23 Ferrante Expert Report, GOOG-AT-MDL-C-000020714
15. 2024.01.23 Ghose Expert Report, GOOG-AT-MDL-C-000020767
16. 2024.01.23 Israel Expert Report, GOOG-AT-MDL-C-000021036
17. 2024.01.23 Milgrom Expert Report, GOOG-AT-MDL-C-000021794
18. 2024.01.23 Rinard Expert Report, GOOG-AT-MDL-C-000022191
19. 2024.01.23 Shirky Expert Report, GOOG-AT-MDL-C-000022229
20. 2024.01.23 Simonson Expert Report, GOOG-AT-MDL-C-000022290
21. 2024.01.23 Skinner Expert Report, GOOG-AT-MDL-C-000022948

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22. 2024.02.13 Expert Rebuttal Report of Adoria Lim, GOOG-AT-MDL-C-000023002
23. 2024.02.13 Expert Rebuttal Report of Gabriel Weintraub, GOOG-AT-MDL-C-000023226
24. 2024.02.13 Expert Rebuttal Report of Kenneth Wilbur, GOOG-AT-MDL-C-000023322
25. 2024.02.13 Expert Rebuttal Report of R. Ravi, GOOG-AT-MDL-C-000023435
26. 2024.02.13 Expert Rebuttal Report of Robin S. Lee, GOOG-AT-MDL-C-000023516
27. 2024.02.13 Expert Rebuttal Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000023887
28. 2024.02.13 Expert Rebuttal Report of Timothy Simcoe, GOOG-AT-MDL-C-000024064
29. 2024.02.13 Expert Rebuttal Report of Wayne Hoyer, GOOG-AT-MDL-C-000024138
30. 2024.02.13 Expert Rebuttal Report of Wenke Lee, GOOG-AT-MDL-C-000024270
31. 2024.02.16 Errata to Ravi Rebuttal Report, GOOG-AT-MDL-C-000024387
32. 2024.02.20 Errata to Simcoe Rebuttal Report, GOOG-AT-MDL-C-000024389
33. 2024.02.23 Errata to Weintraub Rebuttal Report, GOOG-AT-MDL-C-000024390
34. 2024.02.23 Supplemental Errata to Weintraub Expert Report, GOOG-AT-MDL-C-000024391
35. 2024.02.24 Errata to Wilbur Rebuttal Report, GOOG-AT-MDL-C-000024392
36. 2024.02.26 Errata to Hoyer Rebuttal Report, GOOG-AT-MDL-C-000024397
37. 2024.02.28 Errata to Abrantes-Metz Rebuttal Report, GOOG-AT-MDL-C-000024399
38. 2024.03.04 Expert Supplemental Report of Robin S. Lee, GOOG-AT-MDL-C-000024403
39. 2024.03.08 Consolidated Errata to Lee Rebuttal Report, GOOG-AT-MDL-C-000024436
40. 2024.01.13 Expert Report of Weintraub Errata, GOOG-AT-MDL-C-000040965
41. 2024.01.13 Expert Report of Simcoe Errata, GOOG-AT-MDL-C-000040961
42. 2024.01.13 Expert Report of Respass Errata_with Figure Errata_Redacted, GOOG-AT-MDL-C-000040934
43. 2024.01.13 Expert Report of R Ravi Errata, GOOG-AT-MDL-C-000040931
44. 2024.01.13 Expert Report of Abrantes-Metz Errata, GOOG-AT-MDL-C-000040929

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45. 2024.03.08 Consolidated Errata to Lee Rebuttal Report, GOOG-AT-MDL-C-000040926
46. 2024.03.04 Expert Supplemental Report of Robin S. Lee, PhD, GOOG-AT-MDL-C-000040893
47. 2024.02.28 Rebuttal Report Errata of Rosa Abrantes-Metz Signed, GOOG-AT-MDL-C-000040889
48. 2024.02.25 Expert Rebuttal Report of Hoyer Errata, GOOG-AT-MDL-C-000040887
49. 2024.02.24 Wilbur Rebuttal Errata, GOOG-AT-MDL-C-000040882
50. 2024.02.23 Weintraub Rebuttal Report Errata, GOOG-AT-MDL-C-000040881
51. 2024.02.23 Expert Report of Weintraub Supplemental Errata, GOOG-AT-MDL-C-000040880
52. 2024.02.20 Errata to Simcoe Rebuttal Report, GOOG-AT-MDL-C-000040879
53. 2024.02.16 Errata to Ravi Rebuttal Report (Highly Confidential), GOOG-AT-MDL-C-000040877
54. 2024.02.13 Rebuttal Report of Rosa Abrantes-Metz, GOOG-AT-MDL-C-000040700
55. 2024.02.13 Expert Report of Wenke Lee, GOOG-AT-MDL-C-000040583
56. 2024.02.13 Expert Rebuttal Report of Wayne Hoyer, GOOG-AT-MDL-C-000040451
57. 2024.02.13 Expert Rebuttal Report of Timothy Simcoe_Redacted, GOOG-AT-MDL-C-000040377
58. 2024.02.13 Expert Rebuttal Report of Robin S. Lee_Redacted, GOOG-AT-MDL-C-000040006
59. 2024.02.13 Expert Rebuttal Report of R Ravi, GOOG-AT-MDL-C-000039925
60. 2024.02.13 Expert Rebuttal Report of Kenneth Wilbur_Redacted, GOOG-AT-MDL-C-000039812
61. 2024.02.13 Expert Rebuttal Report of Gabriel Weintraub_Redacted, GOOG-AT-MDL-C-000039716
62. 2024.02.13 Expert Rebuttal Report of Adoria Lim_Redacted, GOOG-AT-MDL-C-000039492
63. 2024.01.23 Expert Report of William Clay Shirky, GOOG-AT-MDL-C-000039431
64. 2024.01.23 Expert Report of Paul R. Milgrom, GOOG-AT-MDL-C-000039034
65. 2024.01.23 Expert Report of Martin C. Rinard, GOOG-AT-MDL-C-000038996
66. 2024.01.23 Expert Report of Mark A. Israel_Redacted, GOOG-AT-MDL-C-000038238
67. 2024.01.23 Expert Report of Judith A. Chevalier_Redacted, GOOG-AT-MDL-C-000037998

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- 68. 2024.01.23 Expert Report of Itamar Simonson, GOOG-AT-MDL-C-000037340
- 69. 2024.01.23 Expert Report of Douglas Skinner, GOOG-AT-MDL-C-000037286
- 70. 2024.01.23 Expert Report of Anthony J. Ferrante, GOOG-AT-MDL-C-000037233
- 71. 2024.01.23 Expert Report of Anindya Ghose_Redacted, GOOG-AT-MDL-C-000036954
- 72. 2023.12.22 Expert Report of Timothy Simcoe_Redacted, GOOG-AT-MDL-C-000036793
- 73. 2023.12.22 Expert Report of Thomas Respass_Redacted, GOOG-AT-MDL-C-000036625
- 74. 2023.12.22 Expert Report of Rosa Abrantes-Metz_Redacted, GOOG-AT-MDL-C-000036305
- 75. 2023.12.22 Expert Report of Robin S. Lee, PhD_Redacted, GOOG-AT-MDL-C-000035792
- 76. 2023.12.22 Expert Report of R Ravi_Redacted, GOOG-AT-MDL-C-000035536
- 77. 2023.12.22 Expert Report of Gabriel Weintraub_Redacted, GOOG-AT-MDL-C-000035253

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Bates Stamped Productions, including access to Plaintiffs' entire production database, as well as the following documents and Google and third-party productions made since June 7, 2024:

- | | | | |
|-----|------------|-----|-------------------------|
| 1. | [REDACTED] | 37. | [REDACTED] |
| 2. | [REDACTED] | 38. | [REDACTED] |
| 3. | [REDACTED] | 39. | [REDACTED] |
| 4. | [REDACTED] | 40. | GOOG-AT-MDL-001263607 |
| 5. | [REDACTED] | 41. | GOOG-AT-MDL-001390730 |
| 6. | [REDACTED] | 42. | GOOG-AT-MDL-001391213 |
| 7. | [REDACTED] | 43. | GOOG-AT-MDL-001933227 |
| 8. | [REDACTED] | 44. | GOOG-AT-MDL-002105969 |
| 9. | [REDACTED] | 45. | GOOG-AT-MDL-002105984 |
| 10. | [REDACTED] | 46. | GOOG-AT-MDL-002124829 |
| 11. | [REDACTED] | 47. | GOOG-AT-MDL-002390899 |
| 12. | [REDACTED] | 48. | GOOG-AT-MDL-002393442 |
| 13. | [REDACTED] | 49. | GOOG-AT-MDL-003161451 |
| 14. | [REDACTED] | 50. | GOOG-AT-MDL-004074544 |
| 15. | [REDACTED] | 51. | GOOG-AT-MDL-004232880 |
| 16. | [REDACTED] | 52. | GOOG-AT-MDL-004233138 |
| 17. | [REDACTED] | 53. | GOOG-AT-MDL-004300268 |
| 18. | [REDACTED] | 54. | GOOG-AT-MDL-004416785 |
| 19. | [REDACTED] | 55. | GOOG-AT-MDL-004436768 |
| 20. | [REDACTED] | 56. | GOOG-AT-MDL-004555181 |
| 21. | [REDACTED] | 57. | GOOG-AT-MDL-006099844 |
| 22. | [REDACTED] | 58. | GOOG-AT-MDL-006161050 |
| 23. | [REDACTED] | 59. | GOOG-AT-MDL-006334729 |
| 24. | [REDACTED] | 60. | GOOG-AT-MDL-006873424 |
| 25. | [REDACTED] | 61. | GOOG-AT-MDL-006966530 |
| 26. | [REDACTED] | 62. | GOOG-AT-MDL-007175167 |
| 27. | [REDACTED] | 63. | GOOG-AT-MDL-007343585 |
| 28. | [REDACTED] | 64. | GOOG-AT-MDL-007346556 |
| 29. | [REDACTED] | 65. | GOOG-AT-MDL-007364833 |
| 30. | [REDACTED] | 66. | GOOG-AT-MDL-007375672 |
| 31. | [REDACTED] | 67. | GOOG-AT-MDL-007387750 |
| 32. | [REDACTED] | 68. | GOOG-AT-MDL-007397182 |
| 33. | [REDACTED] | 69. | GOOG-AT-MDL-007397197 |
| 34. | [REDACTED] | 70. | GOOG-AT-MDL-008148533 / |
| 35. | [REDACTED] | | GOOG-AT-MDL-008148529 |
| 36. | [REDACTED] | 71. | GOOG-AT-MDL-008517788 |
| | | 72. | GOOG-AT-MDL-008588684 |
| | | 73. | GOOG-AT-MDL-008682082 / |
| | | | GOOG-AT-MDL-008682071 |
| | | 74. | GOOG-AT-MDL-008754374 |

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75. GOOG-AT-MDL-008835346	119. GOOG-AT-MDL-016627159
76. GOOG-AT-MDL-008858602	120. GOOG-AT-MDL-016656237
77. GOOG-AT-MDL-008881206	121. GOOG-AT-MDL-016772599
78. GOOG-AT-MDL-008886980	122. GOOG-AT-MDL-016838311
79. GOOG-AT-MDL-008953893	123. GOOG-AT-MDL-016924839
80. GOOG-AT-MDL-008964888	124. GOOG-AT-MDL-016937590
81. GOOG-AT-MDL-008979664	125. GOOG-AT-MDL-016943922
82. GOOG-AT-MDL-008991390	126. GOOG-AT-MDL-016967094
83. GOOG-AT-MDL-009026140	127. GOOG-AT-MDL-017187837
84. GOOG-AT-MDL-009289718	128. GOOG-AT-MDL-017394050
85. GOOG-AT-MDL-009291120	129. GOOG-AT-MDL-017494582
86. GOOG-AT-MDL-009299907	130. GOOG-AT-MDL-017664768
87. GOOG-AT-MDL-009321580	131. GOOG-AT-MDL-017746412
88. GOOG-AT-MDL-009429957	132. GOOG-AT-MDL-017749638
89. GOOG-AT-MDL-012512067	133. GOOG-AT-MDL-017762649
90. GOOG-AT-MDL-012514705	134. GOOG-AT-MDL-017864022
91. GOOG-AT-MDL-012524006	135. GOOG-AT-MDL-018248228
92. GOOG-AT-MDL-012549335	136. GOOG-AT-MDL-018427318
93. GOOG-AT-MDL-012693796	137. GOOG-AT-MDL-018448707
94. GOOG-AT-MDL-012767138	138. GOOG-AT-MDL-018548592
95. GOOG-AT-MDL-012837016	139. GOOG-AT-MDL-018618351
96. GOOG-AT-MDL-012857198	140. GOOG-AT-MDL-018652651
97. GOOG-AT-MDL-013290688	141. GOOG-AT-MDL-018998910
98. GOOG-AT-MDL-013291089	142. GOOG-AT-MDL-019001498
99. GOOG-AT-MDL-013292974	143. GOOG-AT-MDL-019306356
100. GOOG-AT-MDL-013299524	144. GOOG-AT-MDL-019386250
101. GOOG-AT-MDL-013299531	145. GOOG-AT-MDL-019552139
102. GOOG-AT-MDL-013300202	146. GOOG-AT-MDL-019571201
103. GOOG-AT-MDL-013378392	147. GOOG-AT-MDL-019588187
104. GOOG-AT-MDL-013908958	148. GOOG-AT-MDL-019633443
105. GOOG-AT-MDL-013918668	149. GOOG-AT-MDL-019642313
106. GOOG-AT-MDL-014427012	150. GOOG-AT-MDL-019653406
107. GOOG-AT-MDL-014460206	151. GOOG-AT-MDL-019721340
108. GOOG-AT-MDL-014462378	152. GOOG-AT-MDL-019767203
109. GOOG-AT-MDL-014486274	153. GOOG-AT-MDL-B-000134141
110. GOOG-AT-MDL-014524447	154. GOOG-AT-MDL-B-001084151
111. GOOG-AT-MDL-014618288	155. GOOG-AT-MDL-B-001140202
112. GOOG-AT-MDL-015241235	156. GOOG-AT-MDL-B-002087955
113. GOOG-AT-MDL-015622194	157. GOOG-AT-MDL-B-002088697
114. GOOG-AT-MDL-015844174	158. GOOG-AT-MDL-B-002088752
115. GOOG-AT-MDL-015929587	159. GOOG-AT-MDL-B-002088926
116. GOOG-AT-MDL-015997353	160. GOOG-AT-MDL-B-002090567
117. GOOG-AT-MDL-016457027	161. GOOG-AT-MDL-B-002091565
118. GOOG-AT-MDL-016534880	162. GOOG-AT-MDL-B-002095353

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163. GOOG-AT-MDL-B-002095501	207. GOOG-AT-MDL-B-007212533
164. GOOG-AT-MDL-B-002095769	208. GOOG-AT-MDL-B-007229334
165. GOOG-AT-MDL-B-002097533	209. GOOG-AT-MDL-B-007232867
166. GOOG-AT-MDL-B-002097570	210. GOOG-AT-MDL-B-007353902
167. GOOG-AT-MDL-B-002097648	211. GOOG-DOJ-12948968
168. GOOG-AT-MDL-B-002098265	212. GOOG-DOJ-13897780
169. GOOG-AT-MDL-B-002099366	213. GOOG-DOJ-13899823
170. GOOG-AT-MDL-B-002105135	214. GOOG-DOJ-13911836
171. GOOG-AT-MDL-B-002500395	215. GOOG-DOJ-13930748
172. GOOG-AT-MDL-B-002514153	216. GOOG-DOJ-13940086
173. GOOG-AT-MDL-B-002547489	217. GOOG-DOJ-14008698
174. GOOG-AT-MDL-B-002552122	218. GOOG-DOJ-14034714
175. GOOG-AT-MDL-B-002624643	219. GOOG-DOJ-14113270
176. GOOG-AT-MDL-B-002760309	220. GOOG-DOJ-14139857
177. GOOG-AT-MDL-B-002762758	221. GOOG-DOJ-14155066
178. GOOG-AT-MDL-B-002763194	222. GOOG-DOJ-14156827
179. GOOG-AT-MDL-B-002764178	223. GOOG-DOJ-14161619
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438. GOOG-TEX-00177559	482. GOOG-TEX-00597317
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440. GOOG-TEX-00216163	484. [REDACTED]
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452. GOOG-TEX-00452866	496. [REDACTED]
453. GOOG-TEX-00513684	497. [REDACTED]
454. GOOG-TEX-00643890	498. [REDACTED]
455. GOOG-TEX-00689539	499. [REDACTED]
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718. GOOG-DOJ-15071643	762. GOOG-DOJ-AT-00634965
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720. GOOG-DOJ-15084805	764. GOOG-DOJ-AT-01016519
721. GOOG-DOJ-15085650	765. GOOG-DOJ-AT-01019307
722. GOOG-DOJ-15129170	766. GOOG-DOJ-AT-01140595
723. GOOG-DOJ-15164364	767. GOOG-DOJ-AT-01251555
724. GOOG-DOJ-15359510	768. GOOG-DOJ-AT-01255154
725. GOOG-DOJ-15370825	769. GOOG-DOJ-AT-01288913
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727. GOOG-DOJ-15421837	771. GOOG-DOJ-AT-01423537
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734. GOOG-DOJ-15472771	778. GOOG-DOJ-AT-01682498

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784. GOOG-DOJ-AT-01827124	828. GOOG-NE-07294175
785. GOOG-DOJ-AT-01831448	829. GOOG-NE-09426318
786. GOOG-DOJ-AT-01849832	830. GOOG-NE-10291781
787. GOOG-DOJ-AT-01892558	831. GOOG-NE-10493534
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789. GOOG-DOJ-AT-01908449	833. GOOG-NE-11849783
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792. GOOG-DOJ-AT-02147591	836. GOOG-NE-13197548
793. GOOG-DOJ-AT-02149824	837. GOOG-NE-13199159
794. GOOG-DOJ-AT-02151279	838. GOOG-NE-13202480
795. GOOG-DOJ-AT-02151860	839. GOOG-NE-13203514
796. GOOG-DOJ-AT-02156432	840. GOOG-NE-13209197
797. GOOG-DOJ-AT-02156890	841. GOOG-NE-13210980
798. GOOG-DOJ-AT-02172942	842. GOOG-NE-13212314
799. GOOG-DOJ-AT-02190909	843. GOOG-NE-13217070
800. GOOG-DOJ-AT-02193235	844. GOOG-NE-13226622
801. GOOG-DOJ-AT-02195580	845. GOOG-NE-13231717
802. GOOG-DOJ-AT-02195610	846. GOOG-NE-13231861
803. GOOG-DOJ-AT-02195675	847. GOOG-NE-13232022
804. GOOG-DOJ-AT-02197386	848. GOOG-NE-13351825
805. GOOG-DOJ-AT-02199374	849. GOOG-NE-13357217
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816. GOOG-DOJ-AT-02640072	860. GOOG-NE-13603380
817. GOOG-NE-02632899	861. GOOG-NE-13604113
818. GOOG-NE-03597611	862. GOOG-NE-13604518
819. GOOG-NE-03616755	863. GOOG-TEX-00041478
820. GOOG-NE-03634720	864. GOOG-TEX-00059386
821. GOOG-NE-04384116	865. GOOG-TEX-00079917
822. GOOG-NE-04719370	866. GOOG-TEX-00090958

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867. GOOG-TEX-00093402
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869. GOOG-TEX-00104475
870. GOOG-TEX-00118526
871. GOOG-TEX-00134993
872. GOOG-TEX-00263099
873. GOOG-TEX-00264386
874. GOOG-TEX-00304200
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876. GOOG-TEX-00363227
877. GOOG-TEX-00595685
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883. GOOG-TEX-00831090
884. GOOG-TEX-00969363
885. GOOG-TEX-00969653
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892. GOOG-TEX-01231847
893. GOOG-TX-00001418
894. GOOG-TX-00093439
895. GOOG-TX-00597317
896. [REDACTED]
897. [REDACTED]
898. [REDACTED]
899. [REDACTED]

APPENDIX D

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Appendix D: Amended Materials Relied Upon For June 7, 2024 Expert Report of John Chandler, Ph.D.

MATERIALS RELIED UPON

Publicly Available Materials

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Depositions

1. [REDACTED]
2. [REDACTED]

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3. [REDACTED]
4. Deposition of [REDACTED], April 19, 2024.
5. Deposition of [REDACTED], April 30, 2024.
6. [REDACTED]
7. [REDACTED]
8. [REDACTED]
9. [REDACTED]
10. Deposition of [REDACTED], May 21, 2024.
11. Deposition of [REDACTED], May 1, 2024
12. [REDACTED]
13. Deposition of [REDACTED], May 2, 2024.
14. Deposition of [REDACTED], April 12, 2024.
15. Deposition of [REDACTED], April 3, 2024.
16. Deposition of [REDACTED], April 19, 2024.

Bates Stamped Documents

1. GOOG-AT-MDL-000016711
2. GOOG-AT-MDL-003164171
3. GOOG-AT-MDL-008962081.
4. GOOG-AT-MDL-012692665
5. GOOG-AT-MDL-014566659
6. GOOG-AT-MDL-015179479.
7. GOOG-AT-MDL-016487180
8. GOOG-AT-MDL-016487185.
9. GOOG-AT-MDL-017664752
10. GOOG-AT-MDL-018794833
11. GOOG-AT-MDL-019653416.
12. GOOG-AT-MDL-B-001646464
13. GOOG-AT-MDL-B-004637455
14. GOOG-AT-MDL-C-000035792
15. GOOG-DOJ-AT-02191375
16. GOOG-DOJ-AT-02471194
17. GOOG-DOJ-13997420.
18. GOOG-DOJ-14008627
19. GOOG-DOJ-27760500
20. GOOG-DOJ-27760516.
21. GOOG-DOJ-32277200.

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- 22. GOOG-TEX-00090151
- 23. GOOG-TEX-00110540
- 24. GOOG-NE-11753797
- 25. [REDACTED]
- 26. [REDACTED]